The RUBBER AGE

February, 1947

R. T. VANDERBILT CO. N.Y. AMERICAN PRODUCTS

LATEX and DISPERSIONS

Thicken less and
cure FASTER at
LOWER temperature with

SETSIT-5

EFFECTIVE
in NATURAL RUBBER
GR-S; GR-M and DISPERSIONS

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

THERMOFLEX A

Outstanding Inhibitor of Flex-Cracking

THERMOFLEX A is highly effective for protection against flex-cracking and other types of fatigue deterioration in rubber, GR-S and reclaimed stocks. In addition, Thermoflex A provides good protection against heat deterioration and deterioration from natural aging.

Flexing tests, conducted in the laboratory, prove the effectiveness of Thermoflex A in overcoming flexing failure of natural-rubber compounds. Samples for testing were prepared according to the following recipes:

	Compound No. 400-1914	Compound No. 400-1920
Smoked Sheets	100	100
Zinc Oxide	5	5
Channel Black	50	50
Stearic Acid	3	3
Pine Tar	1.5	1.5
Sulfur	3	3
Zenite B	1.25	1.25
Thermoflex A	1	—

The test specimens were cured for 60 min. @ 274° F, aged in air at 158° F, and then tested on the Du Pont Flexing Machine according to Method C of the Standard Method of Dynamic Testing for Cracking of Rubber Products (ASTM D 430-40). The degree of cracking is expressed in units from 0 to 10. A sample is rated as 10 when it is cracked completely across the grooves. Zero rating indicates no cracking. The results of the test follow:

FLEX RATING

	Flexing Time 64 Hrs.	136 Hrs.
Compound 400-1914 (1% Thermoflex A)	0	2.5
Compound 400-1920 (Control)	10	discontinued after 64 hrs.

These results clearly show the effectiveness of Thermoflex A in overcoming flex-cracking. If you have a problem involving flex resistance, specify Thermoflex A. Write for detailed information.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co., (Inc.), Wilmington 98, Del.

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

DU PONT

REG. U. S. PAT. OFF.

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★ SUPERB ★

OIL RESISTANCE

is only one of Hycar synthetic rubber's unusual and valuable properties. Others are listed in the box at the right.

But most important, these properties may be had in an almost limitless number of combinations, each designed to meet specific service conditions of the finished Hycar part.

Our files contain more than 5000 recipes for Hycar compounds—each compound engineered to do a certain job. Parts made from HYCAR have seen service in *every* industry, giving long life, dependability, and economical operation.

That's why we say, ask your supplier for parts made from Hycar. Test them in your own application, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Department HB-2 B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. *EXTREME OIL RESISTANCE — insuring dimensional stability of parts.*
2. *HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.*
3. *ABRASION RESISTANCE—50% greater than natural rubber.*
4. *MINIMUM COLD FLOW—even at elevated temperatures.*
5. *LOW TEMPERATURE FLEXIBILITY—down to —65° F.*
6. *LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.*
7. *AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.*
8. *HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.*
9. *NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)*

Hycar

Reg. U. S. Pat. Off.

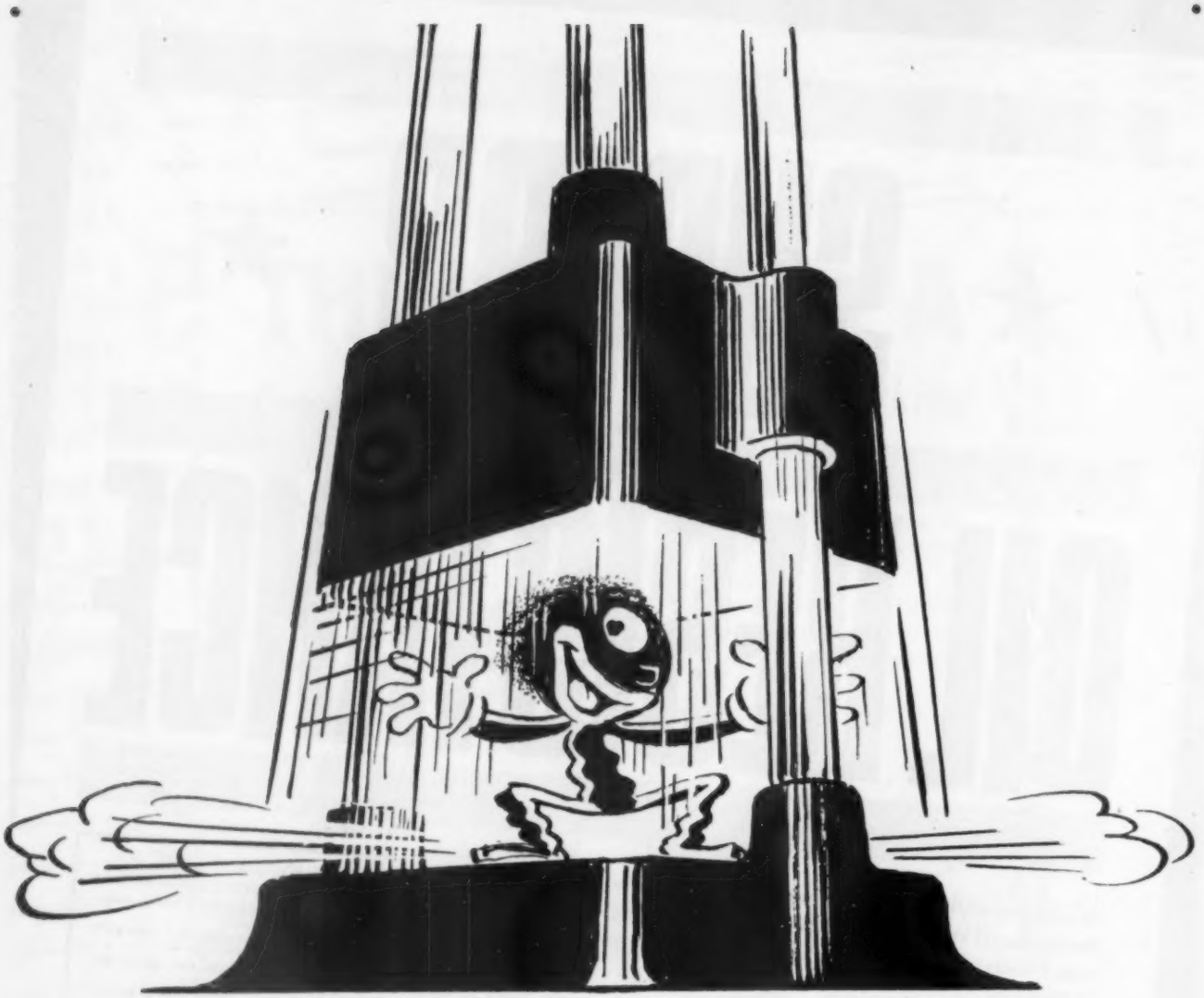
LARGEST PRIVATELY PRODUCED BUTADIENE TYP

American Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B F. GOODRICH COMPAN

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.



JUST CAN'T KEEP A GOOD MAN DOWN!

You certainly can't keep Philblack A down, either! Products made with this lively black are famous for their snappy come-backs, their springy resilience! Boy-oh-boy, how they can take it and bob up smiling . . . !

Now we've been singing the praises of Philblack A these many months. We say —"Philblack A aids in making better rubber products." That's *our* opinion. When you use Philblack A and prove it, then it's *your* opinion, too!

PHILLIPS PETROLEUM COMPANY

Philblack *Division*

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

Not Non-Skid... but Non-Scuff!

THERE'S no guarantee on the seat of the red-cap's pants. But it's a safe bet that the good-looking luggage will come through this spill in perfect shape. That's because it's covered with a new kind of material, calendered from one of the GEON polyvinyl resins. Almost indestructible, this material also resists aging, sunlight, heat, cold, oils and acids, mildew, and most other normally destructive factors.

These and many other important properties may be compounded into literally hundreds of products, for home and industry, that may be made from GEON. GEON can be pressure or injection molded, calendered or cast into sheet or film. In solution or latex forms it can be applied as coatings for fabrics and fibres of all kinds as well as for paper and cardboard. Products made from GEON may be flexible or rigid, clear or opaque, brilliantly or delicately colored.

Thanks to its versatility there are applications for GEON in *every* home—*every* industry—just as there are for other B. F. Goodrich Chemical Company products such as HYCAR American rubber, KRISTON thermosetting resins, GOOD-RITE brand chemicals, and many other products of the present and the future. While we make no finished products we'll be glad to work with you on any special problem or application. Just write B. F. Goodrich Chemical Company, Dept. R-2, Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Luggage is another interesting application for GEON polyvinyl

Luggage covered with Pantasote's Pantex

B. F. Goodrich Chemical Company A DIVISION OF B. F. GOODRICH COMPANY

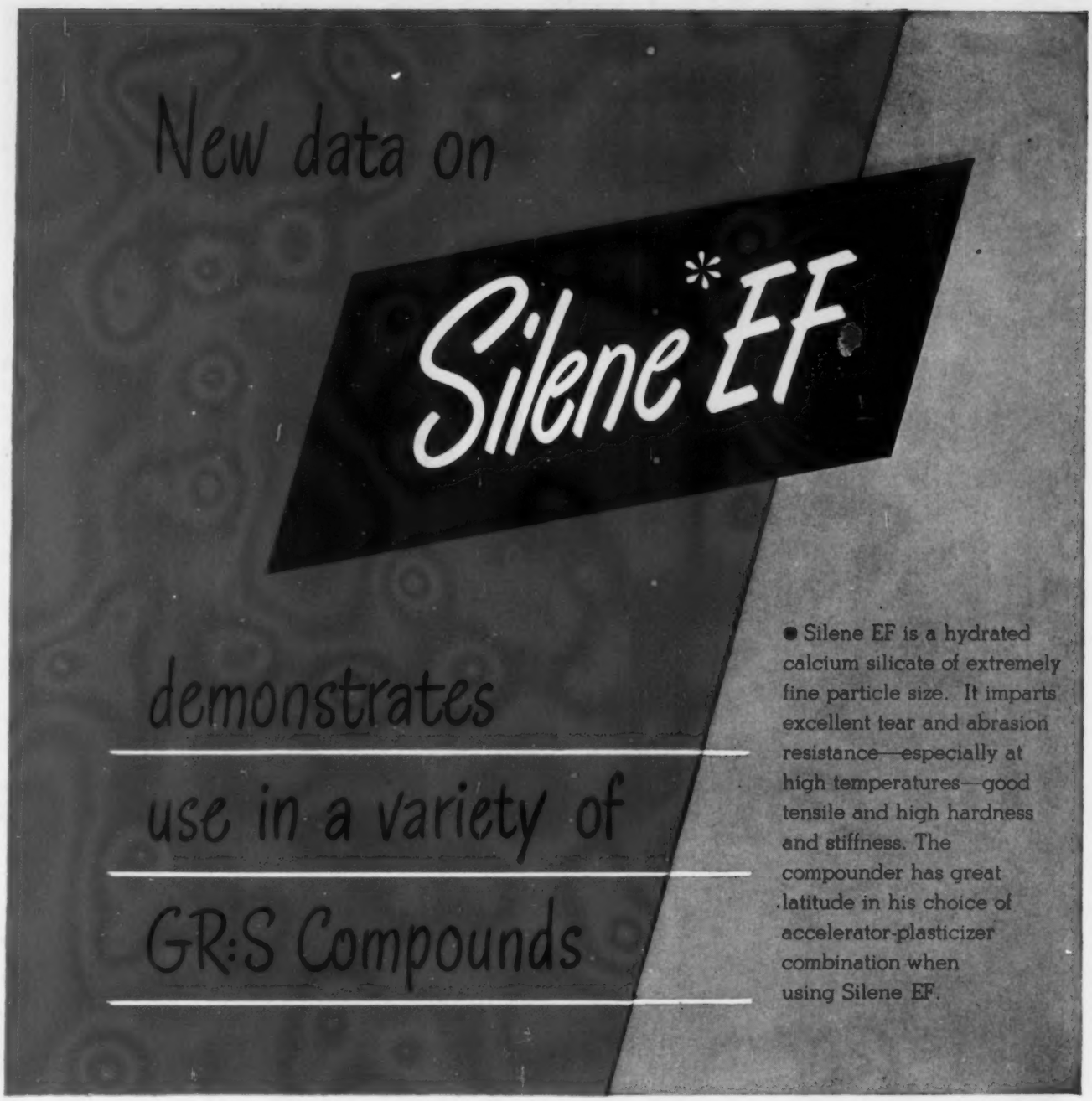
GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE brand chemicals

For technical data please write Dept. CB-2

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO


New data on
Silene* EF
demonstrates
use in a variety of
GR:S Compounds
● Silene EF is a hydrated calcium silicate of extremely fine particle size. It imparts excellent tear and abrasion resistance—especially at high temperatures—good tensile and high hardness and stiffness. The compounder has great latitude in his choice of accelerator-plasticizer combination when using Silene EF.

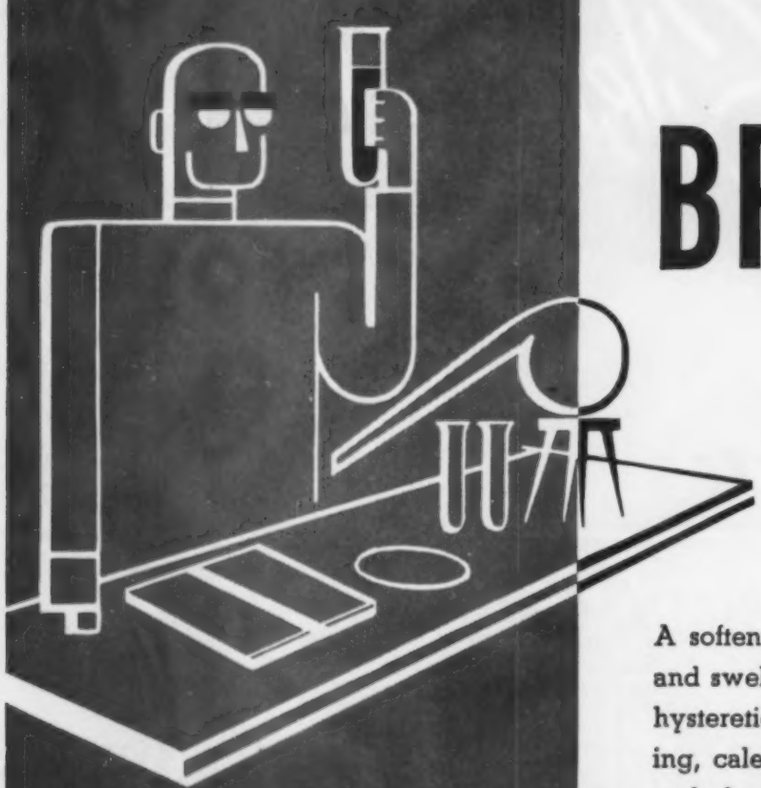
* Trade-Mark Registered U. S. Patent Office

Silene EF has proved a highly effective reinforcing pigment in a wide variety of GR:S compounds. Data just compiled presents physical tests of miscellaneous formulations employing a number of accelerators and plasticizers. The compounder will find this information of value in the development of GR:S stocks which require the characteristics conferred by Silene EF. You are invited to write for Columbia Pigments Data Sheet No. 47-1.

COLUMBIA CHEMICALS
PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
FIFTH AVENUE at BELLEFIELD, PITTSBURGH 13, PENNA. • Chicago • Boston • St. Louis
Pittsburgh • New York • Cincinnati • Cleveland • Philadelphia • Minneapolis • Charlotte • San Francisco

COLUMBIA ESSENTIAL INDUSTRIAL CHEMICALS
Soda Ash · Caustic Soda · Liquid Chlorine · Sodium Bicarbonate · Pittchlor *(Calcium Hypochlorite)* · Silene EF *(Hydrated Calcium Silicate)* · Calcium Chloride · Soda Briquettes *(Iron Desulphurizer)* · Modified Sodas · Caustic Ash · Phosflake *(Bottle Washer)* · Calcene T *(Precipitated Calcium Carbonate)*

FROM THE CATALOG OF BARRETT RUBBER COMPOUNDING MATERIALS...



BRS 700

This recent addition to the Barrett Rubber Compounding Materials line is a black viscous fluid refined from coal tar.

A softener and extender of the solvent and swelling type, BRS 700 confers good hysteretic properties, improves processing, calendering and tubing properties, and also improves resistance to tear and crack-growth. Its principal use is in tire treads and mechanical goods. It is inexpensive and very easy to handle.

Inquiries are invited. Send for Barrett Rubber Laboratory Release No. 4 which contains sample recipes using BRS 700.

Available in drums and tank cars.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.,
5551 St. Hubert Street, Montreal, Que.

*Trade-mark Reg. U. S. Pat. Off.

Barrett*

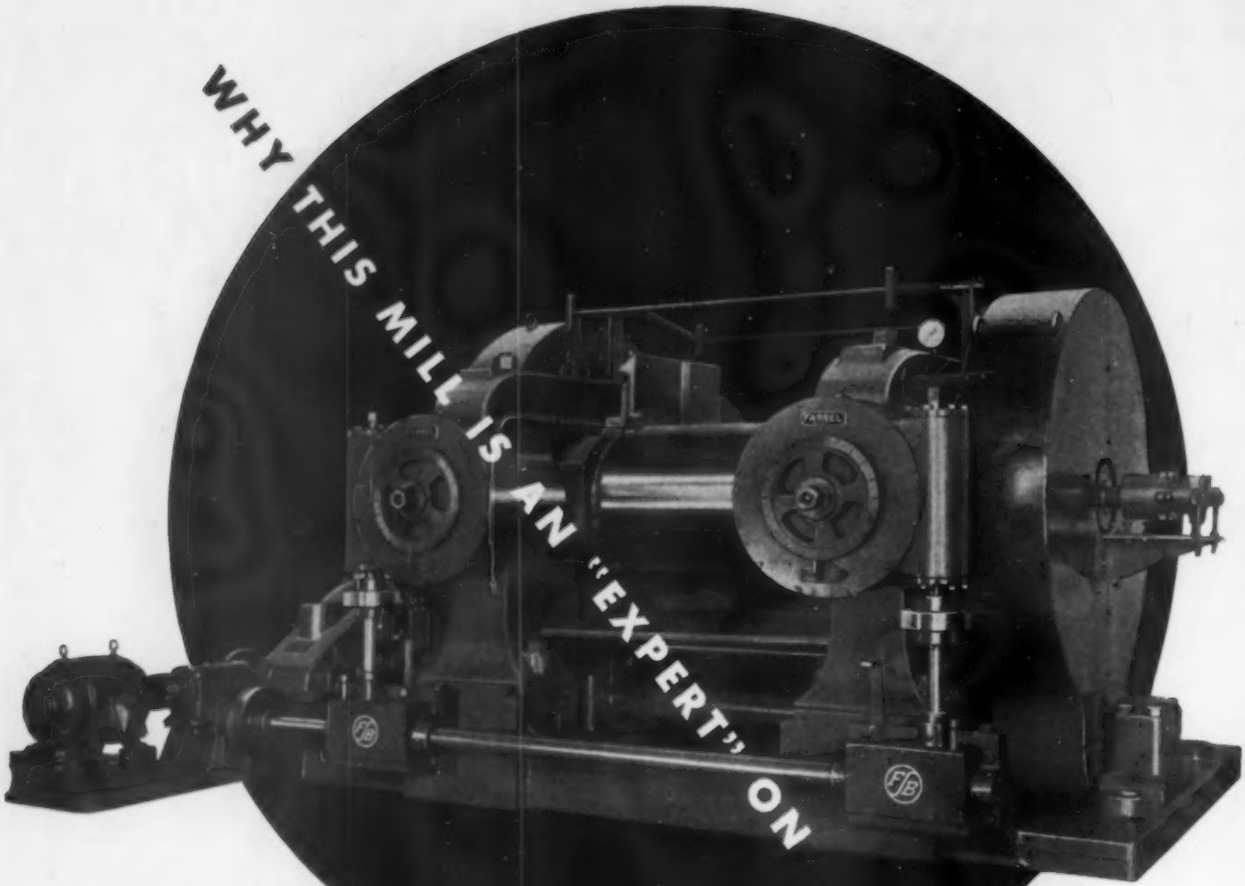
STERLING S*

CABOT

Cabot's Sterling S (SRF)* is a pelletized black, dustless and easy to handle. Rubber chemists everywhere know Sterling S for its outstanding characteristics . . . low heat generation, both in carcass stocks and tubes, high resilience, high loading capacity, and constant uniformity. Sterling S sets the standard by which SRF blacks are judged.

* Semi-Reinforcing Furnace

GODFREY L. CABOT, INC., 77 FRANKLIN ST., BOSTON 10, MASS.



ASPHALTIC TILE

Production Units

- Banbury Mixers
- Plasticators
- Pelletizers
- Mixing, Grinding Warming and Sheeting Mills
- Bale Cutters
- Tubing Machines
- Refiners
- Crackers
- Washers
- Calenders
- Hose Machines
- Hydraulic Presses and other equipment for processing rubber and plastic materials.

By applying the principle of *design-to-fit-the-job*, Farrel-Birmingham engineers have given this 28" x 48" heavy duty mill several special features that make it an "expert" in sheeting and mottling asphaltic tile.

The Meehanite housings are of the weight and proportions ordinarily used for an 84" rubber mill. The rolls are unusually large in diameter to eliminate any possibility of stock "choking" in the bite. To facilitate close temperature control, the rolls are chamber-bored and fitted with rotary joints for circulation of heating or cooling medium.

The full-bronze-lined journal boxes are flood lubricated by circulating oil system. Improved oil seals prevent oil leakage and guard against contamination of stock in process. Motor-operated adjustment for the front roll and large vernier dials on the adjusting screws simplify accurate roll setting and maintenance of correct gauge. Clutches permit independent adjustment of either roll end, or both ends together.

A drive gear and pinion on each roll allow a far greater range of roll opening than can be obtained with connecting gears, increasing the mill's versatility and making it equally adapted to sheeting and mottling.

Complete details of this asphaltic tile mill or of any of the other F-B production units listed here are yours for the asking.

FB-374

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte

Farrel-Birmingham

"Flexol"
Trade-Mark
PLASTICIZERS

"FLEXOL" PLASTICIZERS are designed to meet industry's expanding needs for products with good general characteristics such as compatibility and low volatility. In addition, each "FLEXOL" PLASTICIZER is outstanding in producing one or more special properties such as low-temperature flexibility, resilience, or high impact strength.

"FLEXOL" PLASTICIZERS are successfully serving industry in lacquers, artificial leathers, vinyl films and sheetings, vinyl butyral safety glass, and molded and extruded products based on the vinyl resins and cellulose derivatives.

The "FLEXOL" PLASTICIZERS shown are in commercial production. Several more are available in research or development quantities. Consult us on availability.

Our laboratories have prepared extensive data on the performance of the "FLEXOL" PLASTICIZERS for many uses. This information will assist you in selecting the right "FLEXOL" PLASTICIZER or mixture of plasticizers for your needs.

COMPATIBILITY OF "FLEXOL" PLASTICIZERS (20% OF COMPOSITION) WITH VARIOUS RESINS

	DOP	3GH	3GO	4GO	TOF	B-400	8N8
Vinyl Acetate	I	C	SI	C	C	I	C
Vinyl Butyral	C-L	C	C-L	I	C	I	C
Vinyl Chloride	C	C	C	C	C	I	C
Vinyl Chloride-Acetate	C	C	C	C	C	I	C
Cellulose Acetate	I	I	I	I	SI	I	I
Cellulose Acetate-Butyrate	C	C	C	SI	SI	I	—
Cellulose Nitrate	C	C	C	C	C	C	C
Ethyl Cellulose	C	C	C	C	C	I	C
Synthetic Rubbers	C	C	C	C	C	I	C

C—Compatible S—Slightly
I—Incompatible L—Plasticizer sweats out

A booklet on the general function of plasticizers and the specific uses of "FLEXOL" PLASTICIZERS, Form-5882, may be of help in your application. Phone or write our nearest office for this booklet or for samples and prices.

"Flexol" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

SYNTHETIC ORGANIC CHEMICALS

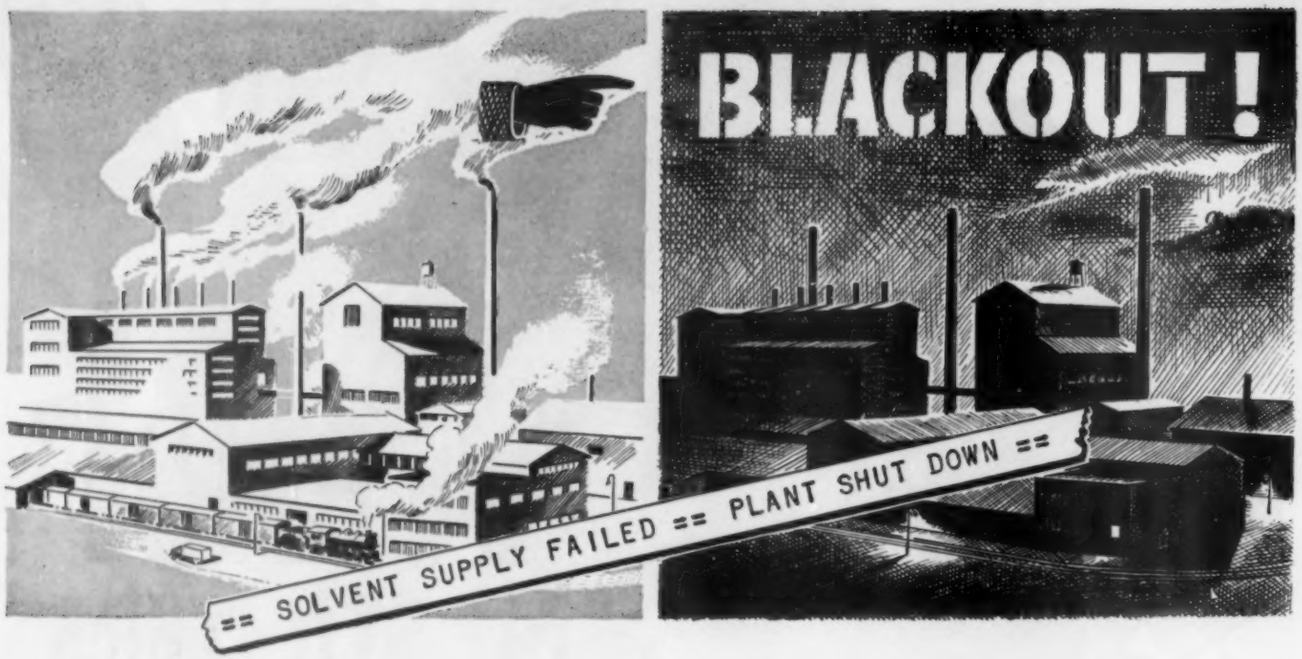
CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y. Offices in Principal Cities

Distributed in Canada by Carbide and Carbon Chemicals, Limited, Toronto



A LESSON ON THE VALUE OF SKELLY'S

Dependability of Supply!

"DOC" MacGEE SAYS: Maybe the possibility of a delivery failure in your solvent supply . . . due to some unforeseen shortage . . . seems remote to you. Perhaps such a solvent shortage has never caused a temporary shutdown in any department of your plant. But the mere fact that the possibility does exist, and that shutdowns of this nature do occur, makes *extra precaution* only sensible. That is why so many solvent users have come to place a high value upon Skellysolve's *dependability of supply*.

Other things are important, too, of course. Purity, uniformity, close boiling ranges, freedom from foreign tastes and odors . . . all these we guard with unceasing vigilance.

Skellysolve's *dependability of supply*, however, is something else. We are proud of our record in supplying various types of special fractions, unfailingly, without regard to weather, season, or rush of previous orders. We have our own facilities for producing, purifying, fractionating, handling, storing, and transporting extra quality naphthas that are unsurpassed in the field. Solvents are our *business*. We have pioneered many of the developments in the field of special naphthas. And we are in the business to stay!

So, if some failure of your solvent supply would be a serious matter in your plant, we suggest that you give Skellysolve a trial. We're sure that, whether you judge your solvent on quality of product, promptness of service, or dependability of supply, you'll be *satisfied* with Skellysolve!

How SKELLYSOLVE Serves the RUBBER INDUSTRY

There are six different types of Skellysolve especially adapted to various uses in this industry, for making rubber cements and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. Our Skellysolve Technical Fieldmen have aided many manufacturers in developing formulas for new or improved products, and in "shooting" solvent troubles. Write today for full information.

SKELLY

Skellysolve

SOLVENTS DIVISION, SKELLY OIL COMPANY, KANSAS CITY, MO.

H-P-M INJECTION MOLDING

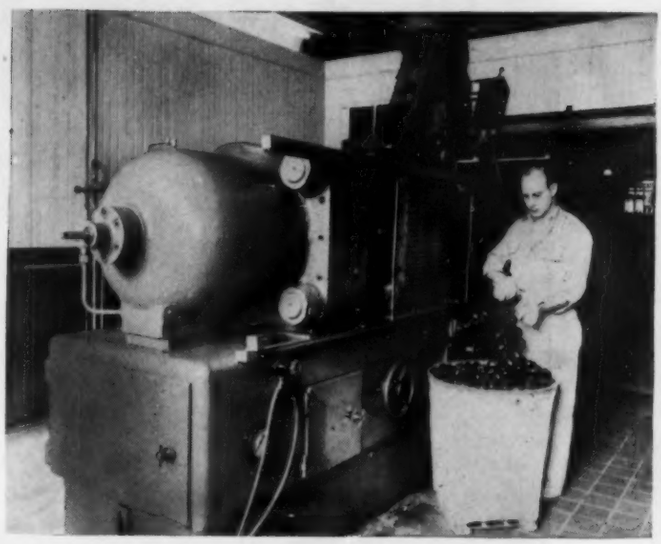
doubles production!

Spark Plug Covers

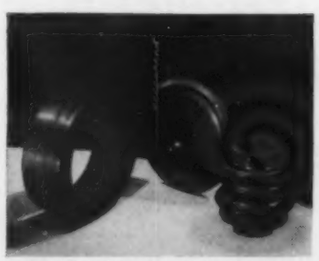
Gaskets

Automobile Snubbers

Milking Machine Tubes



Ice Cream Cabinet Lid



Packing Rings & Joint Covers

Long, thin sections are no problem with an H-P-M Turbojector . . . and the entire molding cycle is *completely automatic.*

But that's only part of the story! You'll cut curing time, too . . . up to 40%. Preforms are entirely eliminated. What's more, there's no flash, so there are no expensive trimming operations. You'll get fewer rejects, less air blistering, back rinding or lamination.

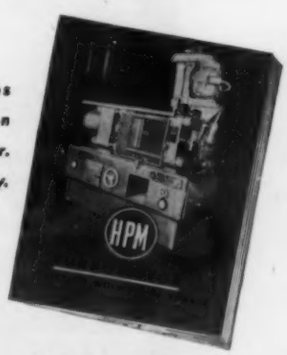
If you're molding rubber parts, it will pay you to investigate the H-P-M Turbojector. An H-P-M engineer will be glad to give you more details. Write today.

THE HYDRAULIC PRESS MANUFACTURING CO.

1014 Marion Road, Mount Gilead, Ohio, U. S. A.

Branch Offices in New York, Philadelphia, Cincinnati, Cleveland, Detroit and Chicago. Representatives in other principal cities. Export Dept., 500 Fifth Ave., New York, N. Y. Cable-"Hydraulic".

Bulletin 4601 gives complete details on the H-P-M Turbojector. Write for your free copy.



HPM **TURBOJECTOR** FOR INJECTION MOLDING OF RUBBER

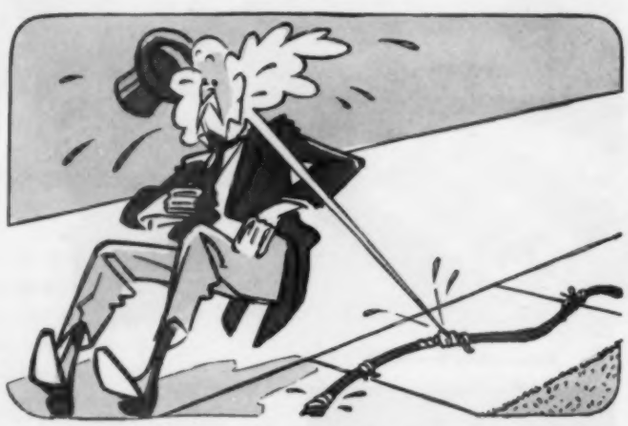
REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

How to make Golf Balls

(ACCORDING TO HOYLE)

1 We found this answer to your golf ball problem in a copy of Hoyle's games published in 1845 when golf, or "goff" was strictly a Scotch game. Golf balls, it says "were made of horse leather, and stuffed with feathers in a peculiar manner, and then boiled."

2 We want to help you make golf balls in your *own* peculiar manner. We can give you a Taylor control setup to help cure the thread, help mold the cover, even help dry the paint. Ask your Taylor Field Engineer.



3 In fact Taylor Instruments help cut cost and improve quality of almost any rubber product. Garden hose, hot water bottles, sponge rubber cushions are made better and cheaper with Taylor Flex-O-Timers on the job.

4 Taylor Accuracy started improving tire production when the only instrumentation was a pressure gauge on a pot heater. Today we can offer you completely automatic control of your tire molding presses.

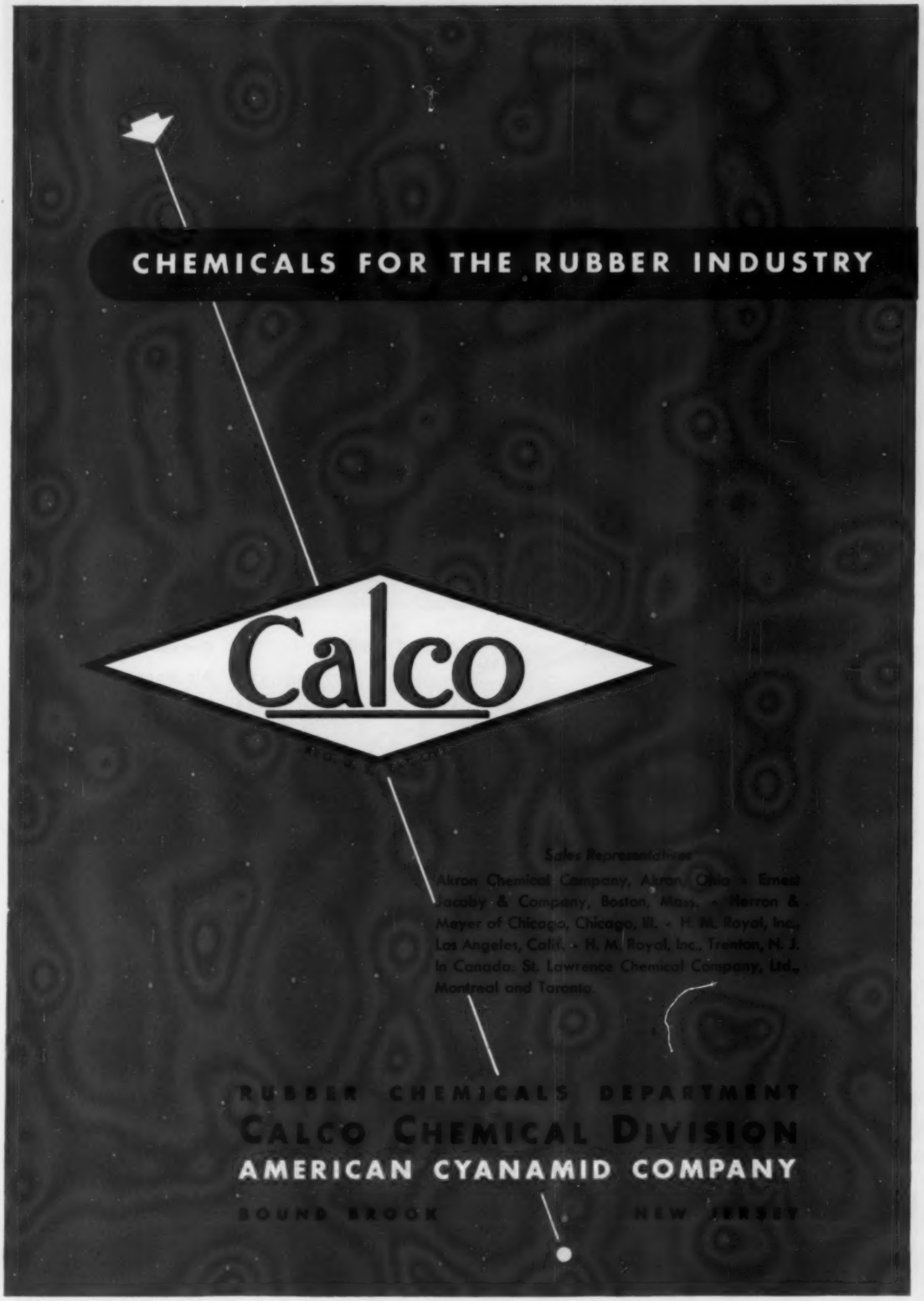
Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY

5 Whatever your problem, natural or synthetic, molding or vulcanizing, we think we can help you increase your efficiency. Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.


CHEMICALS FOR THE RUBBER INDUSTRY
Calco
Sales Representatives
Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J.
In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto.
RUBBER CHEMICALS DEPARTMENT
CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY
BOUND BROOK NEW JERSEY

ANTISOL

A Wax for Improved Resistance to Atmospheric Cracking

Service Station Pneumatic Signal Hose

Garden Hose
Air Hose
Steam Hose
Proofed Goods
Automotive Products
Refrigerator Gaskets

Does not stain or discolor

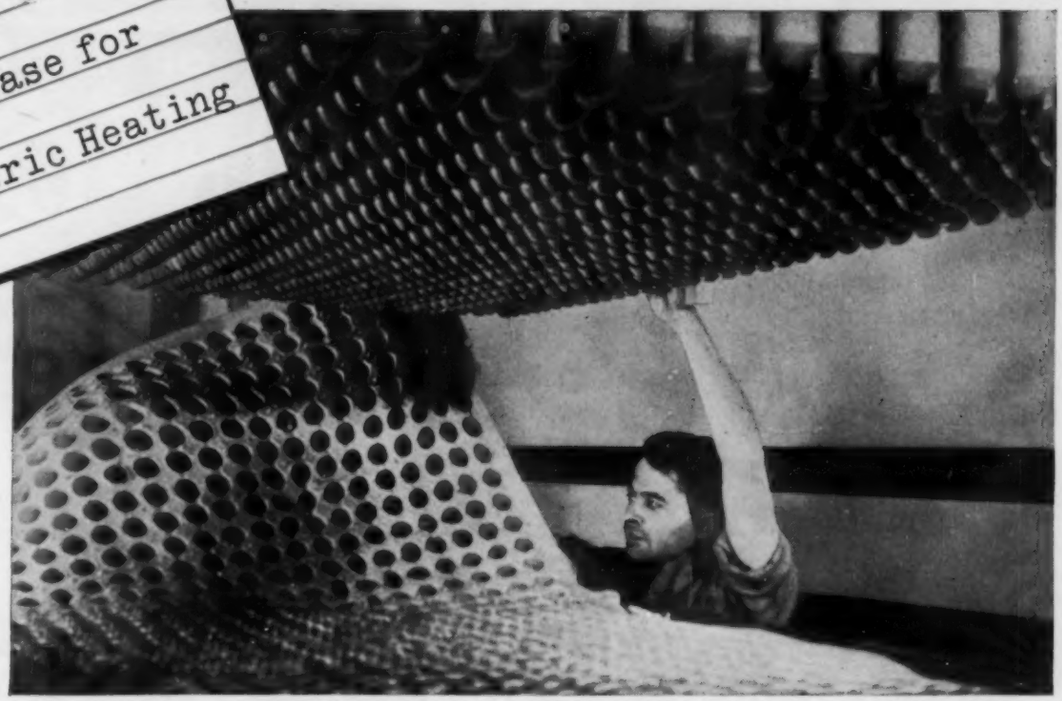
4% Antisol **No Antisol**

RUBBER H AND M PIGMENTS Chemicals

Photographs of service station showing hose in service and close up of hose with and without 4 per cent of Antisol after six months of service. Samples were bent around a mandrel before photographing to show cracking.

HERRON BROS. & MEYER
82 BEAVER ST., NEW YORK 5, N. Y.
516 OHIO BUILDING, AKRON, OHIO
SUPPLIERS OF RUBBER CHEMICALS

The case for Dielectric Heating



putting new bounce into rubber production

*cut curing time by 92%**

Fast and profitable are the words for this newest application of electronics to rubber production. The old, steam-oven process of curing foamed sponge mattresses has yielded to modern electronics of the timesaving Westinghouse r.f. generator.

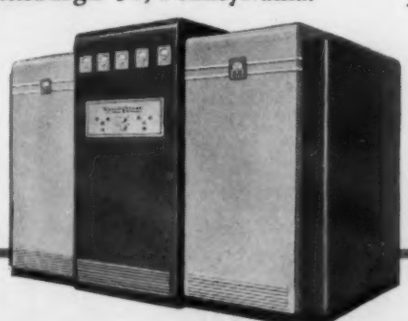
Sixty minutes formerly required for steam curing are now cut to five! And no expensive steel molds are needed to cure the full-size, double bed mattress . . . instead, an insulated mold is filled with the rubber latex mixture and delivered to the curing oven which contains the electrodes.

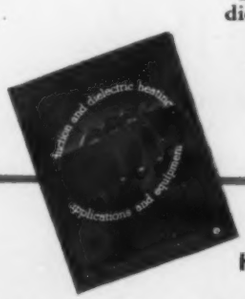
The 100 kw, 13.6 mc generator (see photo below), located in the superstructure above the curing oven, supplies the necessary power. After curing, the mattress is stripped from the mold in its final form (see photo above). Time reduction for curing: 92%!

The result is a better product, cured uniformly throughout the entire mass. Uniformity is obtained on each successive production cycle by automatic load matching networks, output load control and automatic frequency stabilization.

This strong case for dielectric heating in rubber is just one way it has demonstrated its versatility. Get the facts today from your nearest Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-02073

*This is the first of a series of case histories on dielectric heating in rubber production.





Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

HERE'S FREE HELPFUL INFORMATION

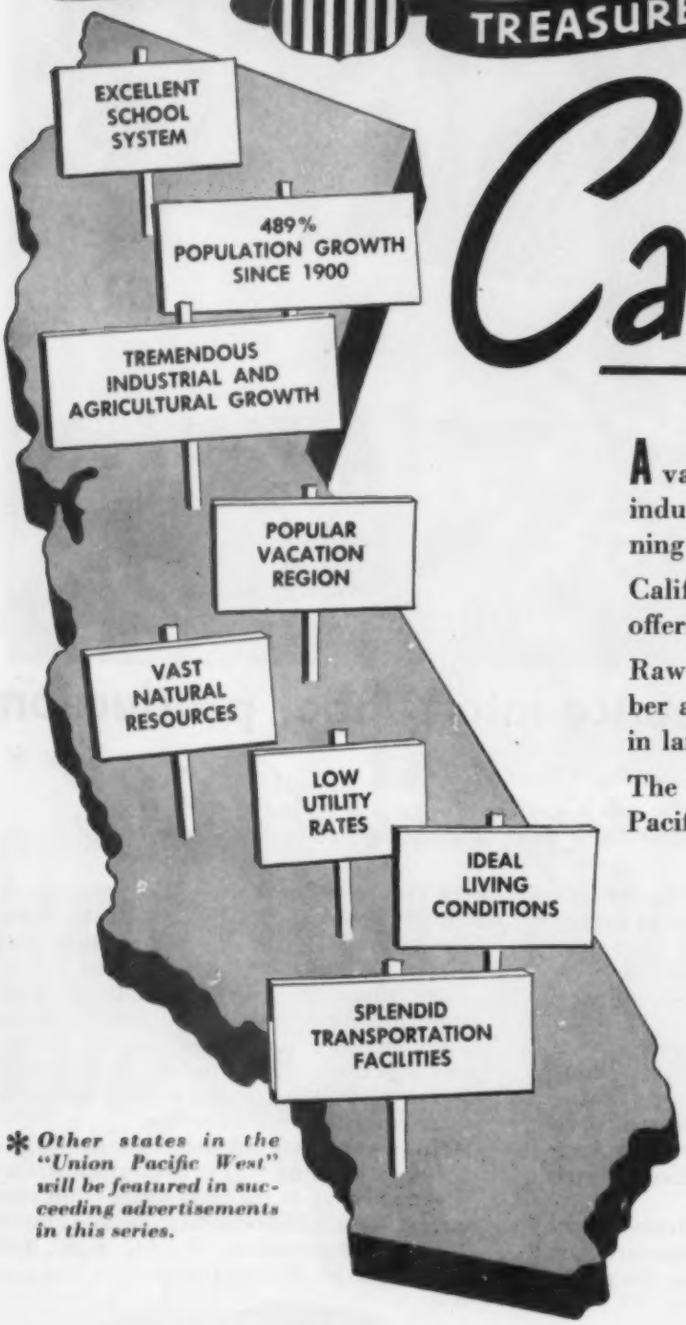
on both induction and dielectric heating . . . their principles and theories; where to use them; how to select them; actual case histories of their use. Write for your copy today, on your business letterhead, please. Ask for B-3620.

Electronics at Work

UNION PACIFIC

TREASURE MAP OF INDUSTRY

California*



A vast opportunity for development awaits industrial and commercial concerns planning a west coast location.

California's population, steadily increasing, offers a tremendous easy-to-reach market.

Raw materials . . . minerals, petroleum, lumber and agricultural products are available in large quantities.

The Golden State is ideally located for Pacific export trade.

Hydro-electric power, nearby natural gas and oil fields, a mild all-year climate are industrial advantages.

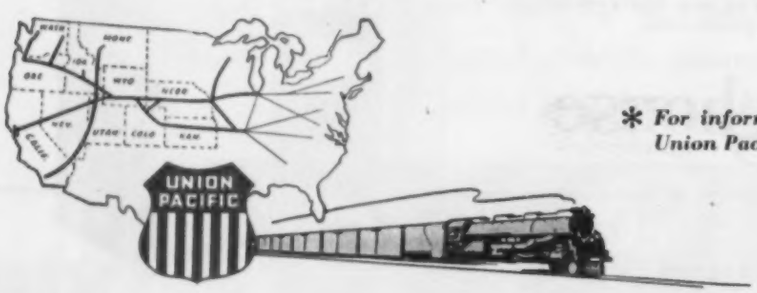
Freight transportation facilities are unsurpassed. California is one of eleven western states served by the Union Pacific Railroad.

For industrial expansion, consider California. For dependable, all-weather transportation, to or from the West, we suggest—

be Specific – say "Union Pacific"

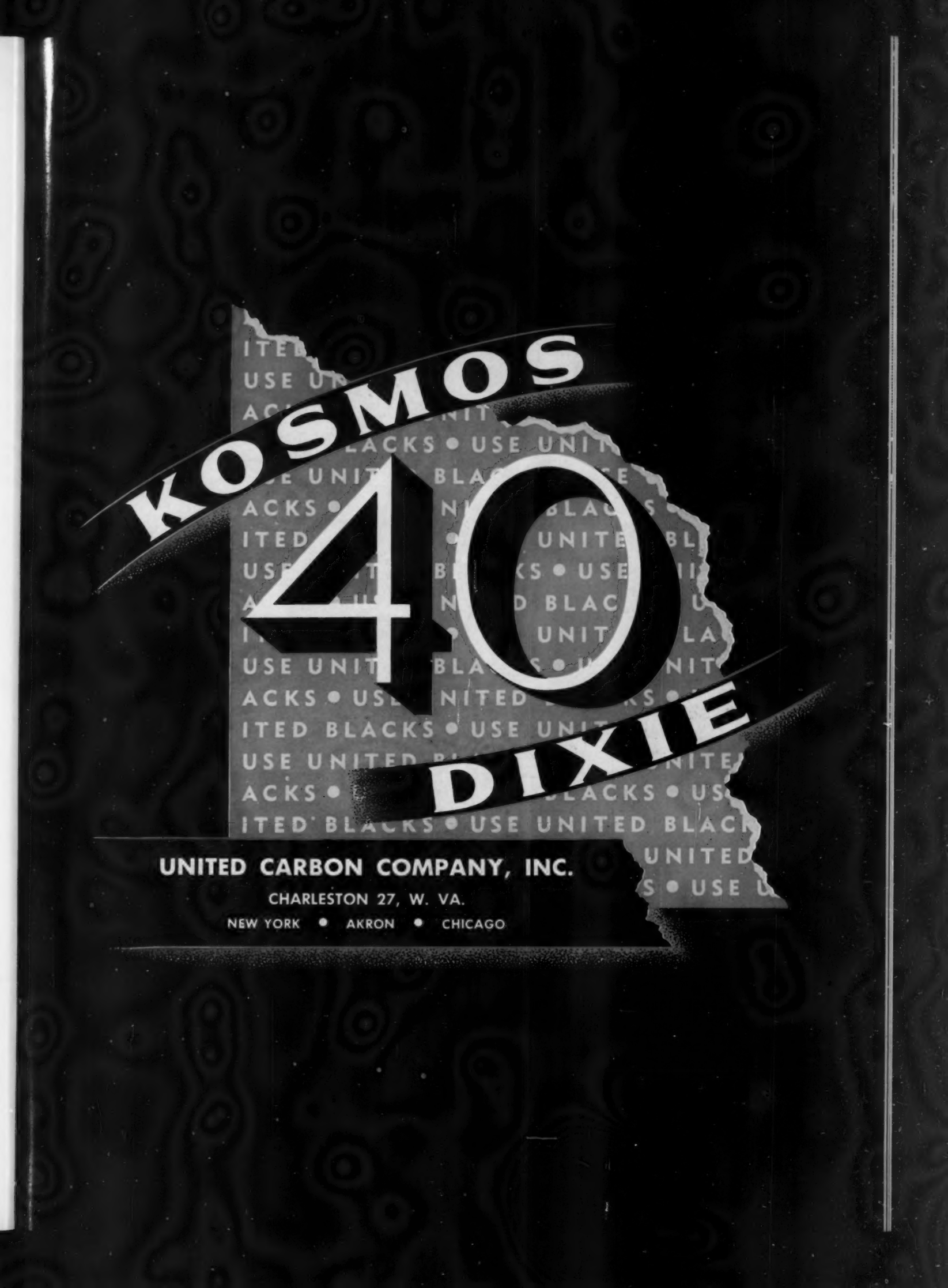
* *Other states in the "Union Pacific West" will be featured in succeeding advertisements in this series.*

* *For information address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska.*



UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE


KOSMOS
40
DIXIE
UNITED CARBON COMPANY, INC.
CHARLESTON 27, W. VA.
NEW YORK • AKRON • CHICAGO

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DIXIE 40 HMF and KOSMOS 40 HMF have these desirable characteristics—cool mixing, easy processing, smooth and rapid extrusion, fast rate of cure, full reinforcement, low heat build-up, high resiliency and high resistance to cut-growth, flex cracking and abrasion. DIXIE 40 and KOSMOS 40 are furnace type reinforcing carbon blacks, produced by a special process under carefully controlled conditions, especially useful for tires of all types, tubes, footwear and mechanical goods.
RESEARCH DIVISION
UNITED CARBON COMPANY, INC.
Charleston 27, West Virginia

ACCELERATORS
PLASTICIZERS
ANTIOXIDANTS

A Complete Line of Approved Compounding Materials

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON OHIO, • LOS ANGELES, CALIF. • CHICAGO, ILL.

TITANOX . . . *the brightest name in titanium pigments*

Improve Rubber Products the "GREAT WHITE WAY"

Brighten and whiten your rubber products with TITANOX. Unusually high whiteness and brightness are developed with these widely used titanium pigments because of their color, high refractive index, extremely fine particle size and ease of dispersion. Also, the clarity of tint of colored rubbers, an extremely desirable characteristic, is enhanced by the use of TITANOX.

TITANOX is so effective that rubber manufacturers have found a little of it goes a long way in treating synthetic as well as natural rubber.

Our Technical Service Department is available, without obligation, for helping or advising you on your rubber pigmentation problems. Phone or write your nearest Titanium Pigment Corporation office today.

• Aerial view of the plant at Sayreville, New Jersey, one of the factories where TITANOX pigments are produced to the standards of unusually high quality that make them *preferred pigments.*

TITANOX

TRADE MARK

TITANIUM PIGMENT CORPORATION

SOLE SALES AGENT

111 Broadway, New York 6, N. Y.
104 So. Michigan Ave., Chicago 3, Ill.
350 Townsend St., San Francisco 7, Cal.
2472 Enterprise St., Los Angeles 21, Cal.

Finish *alone* is not enough. There are other features that have contributed to the increasing demand for R. D. Wood Heating Platens—such as: uniform heat distribution, accurately machined working surfaces parallel within .003", or to closer limits if necessary, regardless of platen size and in the case of steam platens permanent steam tightness. Wood's welded strip or plug construction remains leakproof under the most severe operating conditions.

R. D. Wood facilities for heating platen construction cover units of practically every size, shape and thickness, for use in rubber, plastic, wall board and other fields. Write us today outlining your needs and we will quote you promptly. R. D. Wood Company, Public Ledger Bldg., Independence Square, Philadelphia 5, Pa.

Rigidly located drill heads ensure parallel holes on true center line of plate.

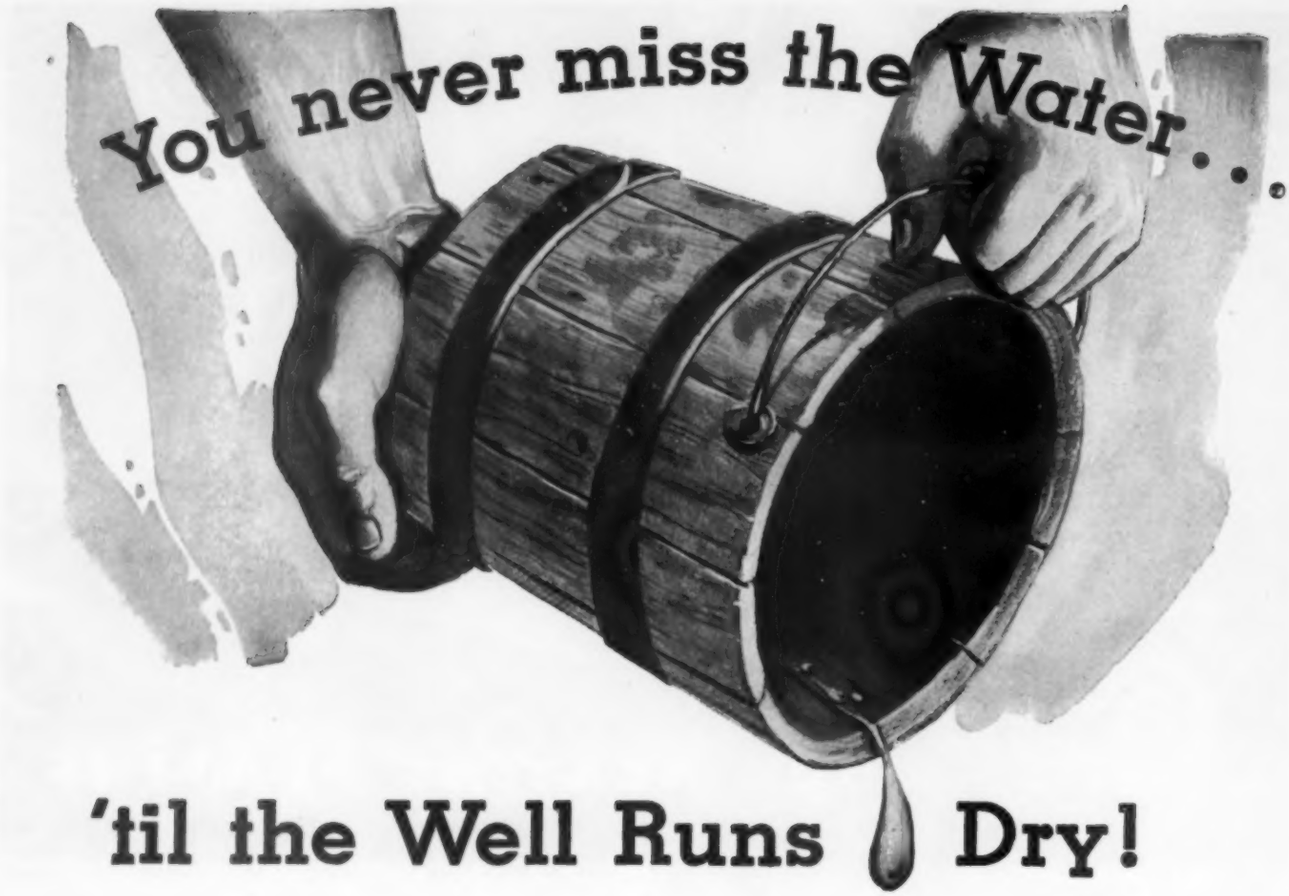
SALES REPRESENTATIVES: Chas. C. Grant, 436 Second National Bldg., Akron 8, Ohio • Harry G. Mouat, Martin Building, Birmingham, Ala. • R. C. Neal Co., 76 Pearl Street, Buffalo, N. Y. • Mills, Winfield & Co., 407 S. Dearborn St., Chicago, Ill. • Dorr-Patterson Eng. Co., 3362 Wight St., Detroit, Mich. • Herman L. Krouse, 4217 Buell Drive, Fort Wayne, Ind. • Fred S. Renauld & Co., 1014 West 84th Place, Los Angeles 44, Calif. • J. Thomas Holveck, P. O. Box 8564, Wabash Station, Pittsburgh, Pa. • Storey Pump & Equipment Co., Harbour Commission Building, Toronto 1, Ont.

BRAZILIAN REPRESENTATIVE: Export Exchange Corp., News Bldg., 220 East 42nd St., New York 17, N.Y. (Exportadora "Extange" Ltda., Sao Paulo, Brazil).

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

R.D. Wood Company

EST 1803



'til the Well Runs Dry!

WHEN scrap rubber is needed, it is usually needed in a hurry—and only a large, well-established organization can afford to maintain the large inventories necessary to produce it in the quantity you want . . . precisely when you want it. Getting the right materials to the right place at the right time is a specialized art. It's compounded of experience, foresight, skill and familiarity with *all* the ways to get the job done the *right* way . . . quickest and best.

Yes, it's a specialized art . . . but it's one at which we have been excelling for well over forty years.

H. MUEHLSTEIN & CO. INC.

122 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: New York • Akron • Chicago • Boston • Los Angeles • Memphis

WAREHOUSES: Jersey City • Akron • Boston • Los Angeles • Memphis

SHELL DUTREX® 15

Modified Asphaltic-Type Softener for GR-S and Natural Rubber Friction and Tread Stocks

SHELL®

Direct inquiries to:

SHELL OIL COMPANY, INCORPORATED

50 WEST 50th ST., NEW YORK 20, N. Y.
(East of Rockies Territory)

100 BUSH ST., SAN FRANCISCO 6, CALIF.
(Pacific Coast Territory)

SHELL OIL COMPANY OF CANADA, LTD., 25 ADELAIDE ST., EAST
TORONTO, CANADA

HOW MODERN ARE YOUR TUBING MACHINES?

THIS suggestion may pay dividends. At your next opportunity, look over your tubing equipment with a critical eye.

What do you see?

Tubers that are modern, in keeping with your other production equipment? Or are you handicapping your output and keeping costs high by the use of outmoded units that should be retired and replaced by more efficient equipment?

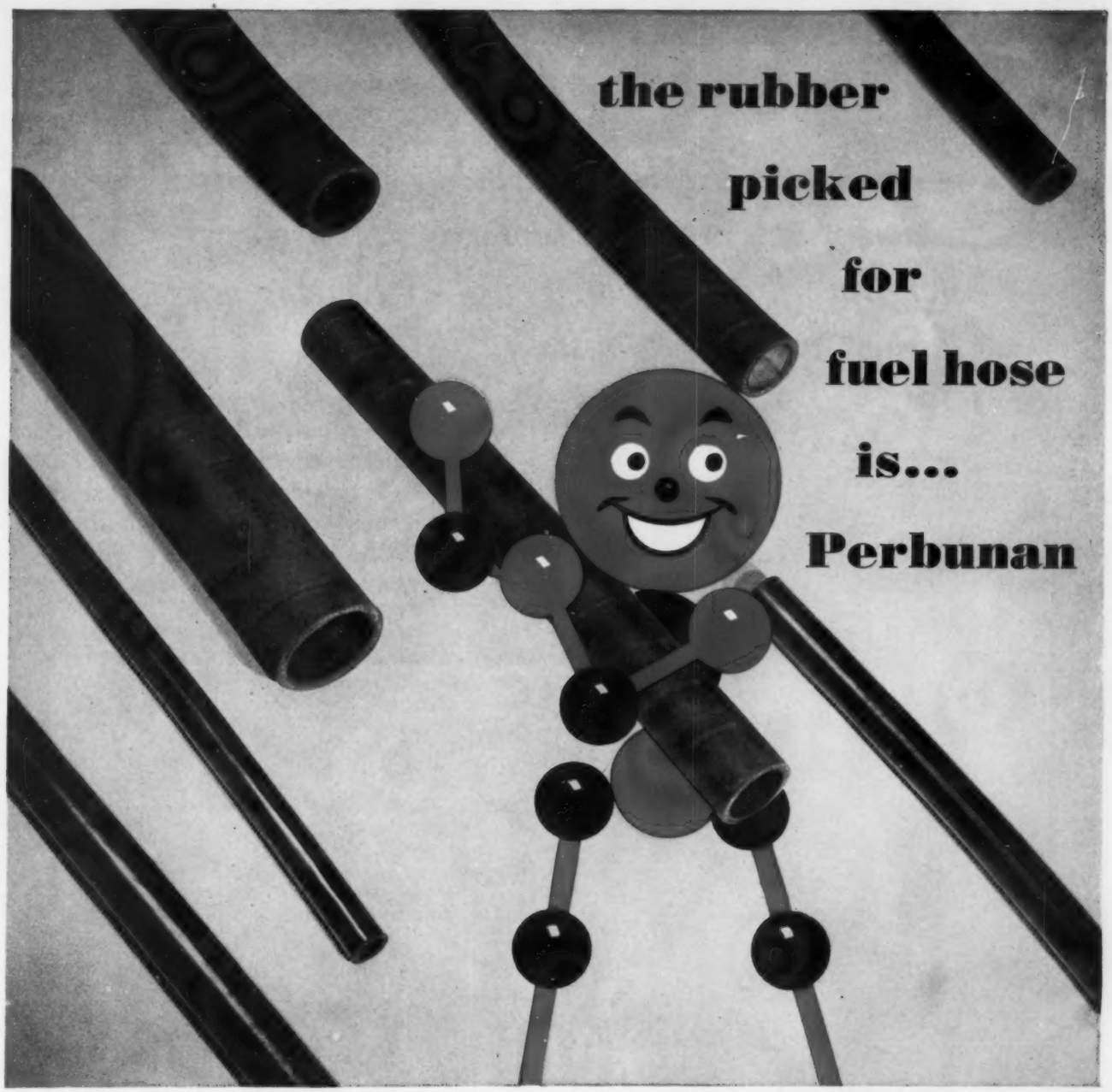
Over the years, NRM engineers have constantly improved heavy duty tubing machines to meet the widening requirements of the rubber industry.

NRM Heavy Duty Tubers are available in 8 different sizes of production models ranging from 2″ to 12″ screw diameters.

To get up-to-date on the design, construction and improvements incorporated into NRM modern tubing machines, write for the latest engineering data and descriptive literature.

NATIONAL RUBBER MACHINERY CO.
General Offices: AKRON 8, OHIO

Creative Engineering



The Metal Hose & Tubing Company of Dover, N. J., picks Perbunan for the rubber backbone of its extensive line of National Synthetic Hose, the "hose for all petroleum products."

Delivering fuel oil and diesel oil...dispensing gasoline from truck and tank...meeting hose specifications of many Army and Navy needs—are but a few instances where Perbunan plays an important helping role in the high performance demanded of National Synthetic Hose.

Our rubber engineers are ready to cooperate on any compounding problems. Write for further information.

For Improved Rubber Parts . . . Compound With PERBUNAN! Resists damage from water, oil, excessive heat, abrasions and petroleum hydrocarbons . . . retains flexibility at sub-zero temperatures!

PERBUNAN
REG. U. S. PAT. OFF.

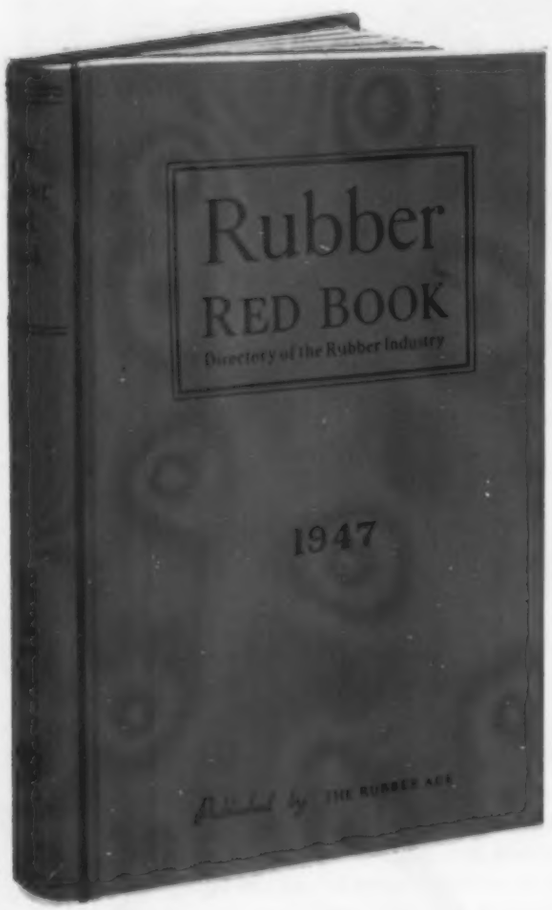
THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Copyright 1947, Enjay Company, Inc.

ENJAY COMPANY, INC. (Formerly Chemical Products Department, Stanco Distributors, Inc.) 26 Broadway New York 4, N. Y.

Advertisers Can't Wait to Get in the Big 1947 RUBBER RED BOOK!

• Already a larger number of advance orders than ever before have been received for the forthcoming issue—indicating the largest issue in its history!



If you have not already ordered space, we suggest you arrange to do so NOW in order to insure your representation in the 1947 issue—scheduled for publication in July. (Send for rate card if you have not received your copy).

The last issue of the RUBBER RED BOOK—the 1945 issue—was the largest ever published, with a total of 696 pages and 242 advertisers. The demand for that issue was so great that inside of three months the complete edition, limited to 3100 copies by paper restrictions, was completely exhausted!

There is, accordingly, a tremendous interest in the 1947 edition as further evidenced by the hundreds of advance orders already on hand. We will spare no effort to bring out the 1947 issue early and the press run will be increased to meet the steadily rising demand.

You, as an advertiser, can capitalize on this situation by making sure as soon as possible that you are represented with ample space in the 1947 edition.

The RUBBER RED BOOK is without a doubt the most indispensable and widely used book in the rubber industry today! It is consulted daily by the industry's key men—buyers, technologists, plant executives and many others—as their primary source of buying information.

What better place then, to tell the story of your products and services than in effective display advertising in the RUBBER RED BOOK? Plan now to use adequate space in the 1947 edition!

Despite higher production costs, we are determined to hold the line on prices as long as possible; therefore there will be no change in basic advertising rates over the 1945 edition. Color charges are however necessarily somewhat higher. (See accompanying box for condensed rate data).

Reserve your space today! Your advertisement in the 1947 edition will pay you dividends until 1949!

1947 EDITION
Cost of Space

1 page	$100.	2 pages	$190.
½ page	55.	2 half pages	106.
¼ page	30.	2 ¼ pages	58.
Colors — Red	extra,		40.
Other Colors	extra,		60.
Bleed Pages	extra,		20%

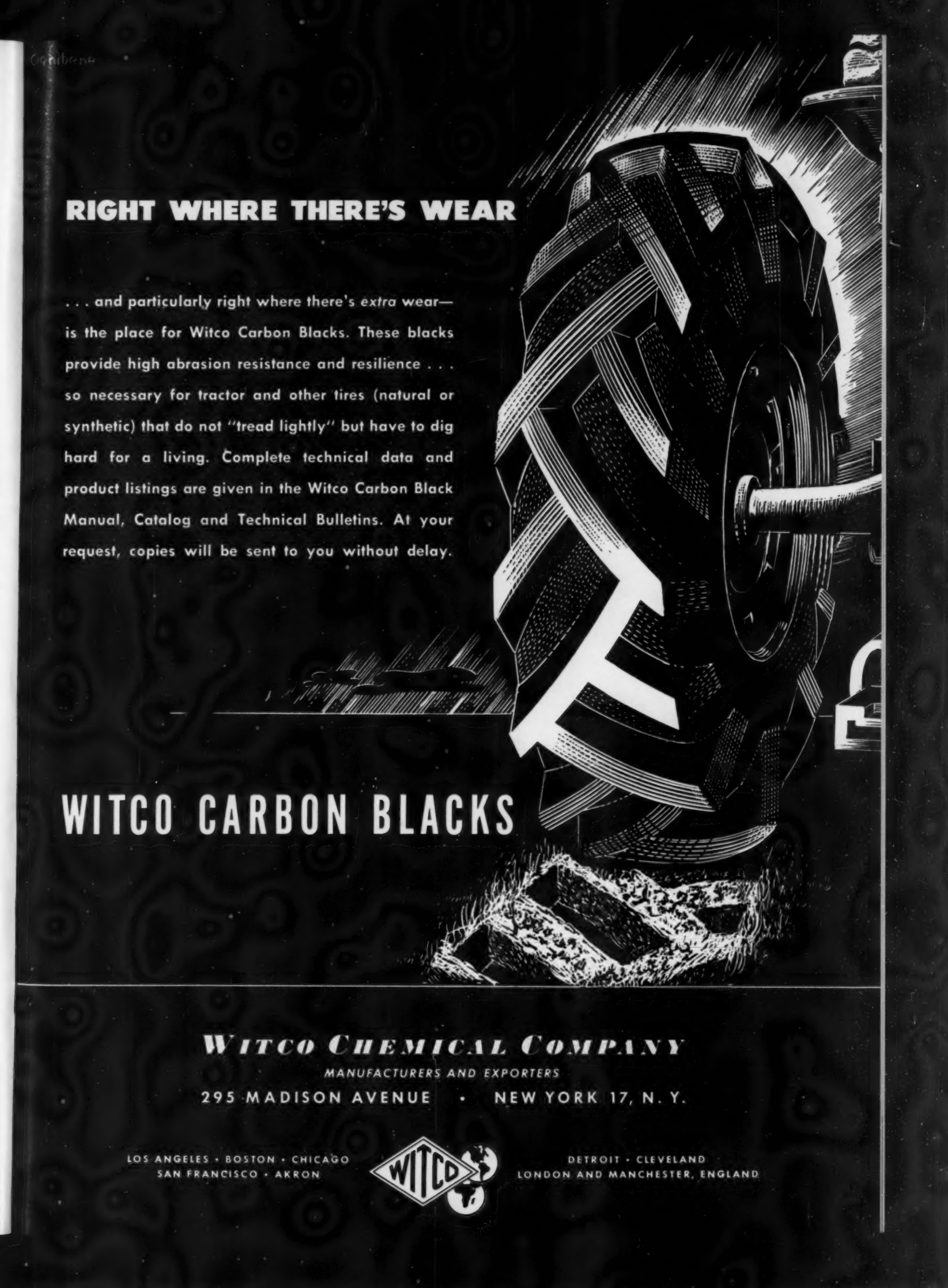
Inserts — Not Accepted

For complete rates and mechanical requirements, write for rate card

Published by

RUBBER AGE

250 W. 57th St., New York 19, N. Y.


RIGHT WHERE THERE'S WEAR
. . . and particularly right where there's extra wear—is the place for Witco Carbon Blacks. These blacks provide high abrasion resistance and resilience . . . so necessary for tractor and other tires (natural or synthetic) that do not "tread lightly" but have to dig hard for a living. Complete technical data and product listings are given in the Witco Carbon Black Manual, Catalog and Technical Bulletins. At your request, copies will be sent to you without delay.
WITCO CARBON BLACKS
WITCO CHEMICAL COMPANY
MANUFACTURERS AND EXPORTERS
295 MADISON AVENUE • NEW YORK 17, N. Y.
LOS ANGELES • BOSTON • CHICAGO
SAN FRANCISCO • AKRON
WITCO
DETROIT • CLEVELAND
LONDON AND MANCHESTER, ENGLAND

Specially ENGINEERED *for specific* END RESULTS

Among Continental's Carbon Blacks are types that are specially engineered for specific end uses. These engineered carbon blacks bring specific advantages to the efficiency of electrically heated flying-suits, aircraft, automobile and farm equipment tires, mechanical goods, rubber footwear, and many other timely applications. Continental Carbon Company's progressive research and development policy provides a *complete line* of specially engineered channel and furnace blacks for a *full range of applications*.

CONTINENTAL CARBON BLACKS

CONTINENTAL F...imparts exceptionally high resistance to abrasive wear. Tensile, tear and hardness high; rebound and plasticity comparatively low.

CONTINENTAL A...combines a high degree of reinforcement with extra resistance to heat build-up and flex cracking.

CONTINENTAL AA...provides high plasticity and resistance to heat build-up...fast-rate cure.

CONTINEX HMF (furnace black)...combines high modulus and extra wear resistance...superior resilience and resistance to heat build-up and flex cracking.

CONTINEX SRF (furnace black)...permits very high loadings yet produces softer stocks. Achieves high resilience and resistance to heat generation.

Write for Samples and Full Technical Data

CONTINENTAL CARBON COMPANY — *MANUFACTURER*

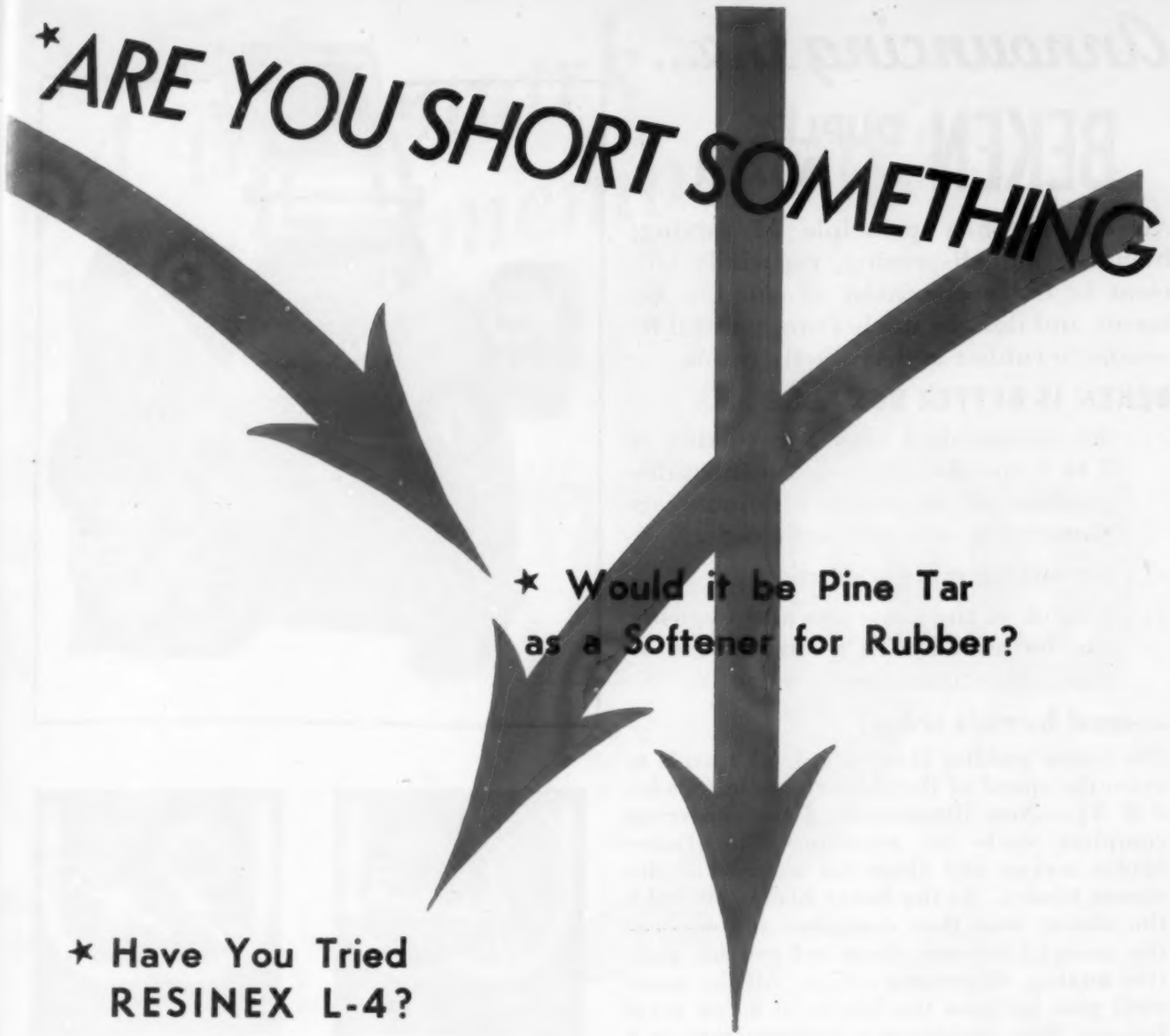
WITCO CHEMICAL COMPANY — *DISTRIBUTOR AND EXPORTER*

CONTINENTAL CHANNEL AND FURNACE BLACKS

295 MADISON AVENUE, NEW YORK 17, N. Y.

Boston • Chicago • Cleveland • Akron • Detroit • San Francisco • Los Angeles • London

★ARE YOU SHORT SOMETHING



★ Would it be Pine Tar as a Softener for Rubber?

★ Have You Tried RESINEX L-4?

That problem of finding a suitable softener for rubber may well be answered with RESINEX L-4. . . . In these times of shortages of softeners formerly used, RESINEX L-4 is being used in an increasing number of plants with results comparable with the best of the old-line rubber softeners. . . . There is an abundant supply of RESINEX L-4—and it is quite economical in cost, too. . . . We have a laboratory bulletin showing comparative results between Pine Tar and RESINEX L-4. It contains information that may be surprisingly important to you. Write for a copy.

HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

Branches: Boston . . . Trenton . . . Chicago . . . Los Angeles

Announcing the...

BEKEN DUPLEX MIXER

An entirely new principle of mixing, blending and dispersing, especially efficient in the preparation of slurries, cements and doughs made from natural or synthetic rubber and synthetic resins.

BEKEN IS BETTER BECAUSE . . .

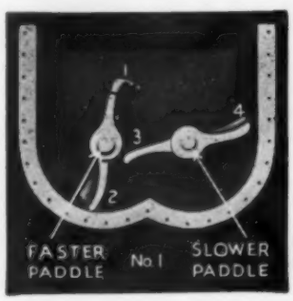
. . . the intermeshed blades, revolving at 2 to 1 speeds, promote uniform dispersion of pigments, eliminate agglomerates and gel particles;

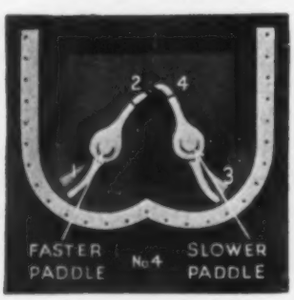
. . . the mixing cycle is shorter;

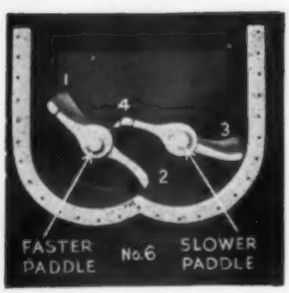
. . . a batch of the same size and viscosity can be mixed with a smaller motor than other machines require.

—and here's why!

The faster paddle, (blades 1 & 2) travels at twice the speed of the slower paddle (blades 3 & 4).—Note illustrations 1 to 6 covering complete cycle of rotation.—The faster blades scrape and clean the surface of the slower blades. As the faster blades overtake the slower ones they compress and squeeze the material between them and provide positive mixing, dispersing action. All the materials pass between the blades in a few revolutions, thus providing a uniform mix in a minimum of time.







For further information write to:

RESEARCH MECHANICAL ENGINEERS DEVELOPMENT

Bramley Machinery Corporation

15 PARK ROW NEW YORK 7, N. Y.

A trademark worth remembering

NEVILLE

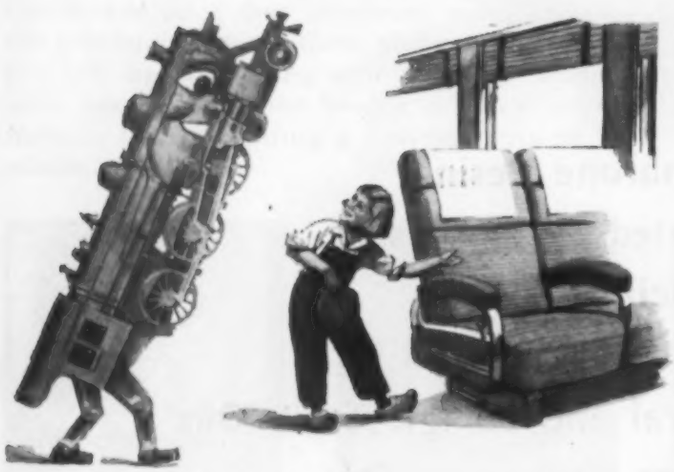
- Coumarone Resins
- Alkylated Phenol Resins
- Plasticizing Oils
- Coal-Tar Solvents
- Neutral and Shingle Stain Oils
- Rubber Reclaiming Oils
- Chemical Specialties

THE NEVILLE COMPANY
PITTSBURGH, 25, PA.
Chemicals for the Nation's Vital Industries

A-23

From Tires for Planes

...to Seats for Trains



Dutch Boy: "To make a *good* rubber product a *better* rubber product . . . make it with Red Lead."

You: "I suppose you can back up that statement?"

Dutch Boy: "Sure I can. Practical manufacturing experience has borne out our research findings. It *proves* that compounding rubber with #2 RM Red Lead gives the seven advantages listed below."

You: "Don't the advantages depend on what product I'm making?"

Dutch Boy: "They do; for instance, if you make tires all seven advantages apply. But most of them are important with other products, too."

You: "Suppose my base is GR-S. Do they still apply?"

Dutch Boy: "Absolutely—GR-S, GR-S-10, GR-M, GR-A or GR-I. Just let us know your specific application and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, New York."

COMPOUND RUBBER WITH #2 RM RED LEAD FOR 7 GOOD REASONS

1. *Improved Heat Stability—Retention of Elasticity*
2. *Lower Heat Build-up—Cooler Running*
3. *Economical*
4. *Faster Curing Rate*
5. *Extended Curing Range*
6. *Excellent General Physical Properties*
7. *Safe Processing*

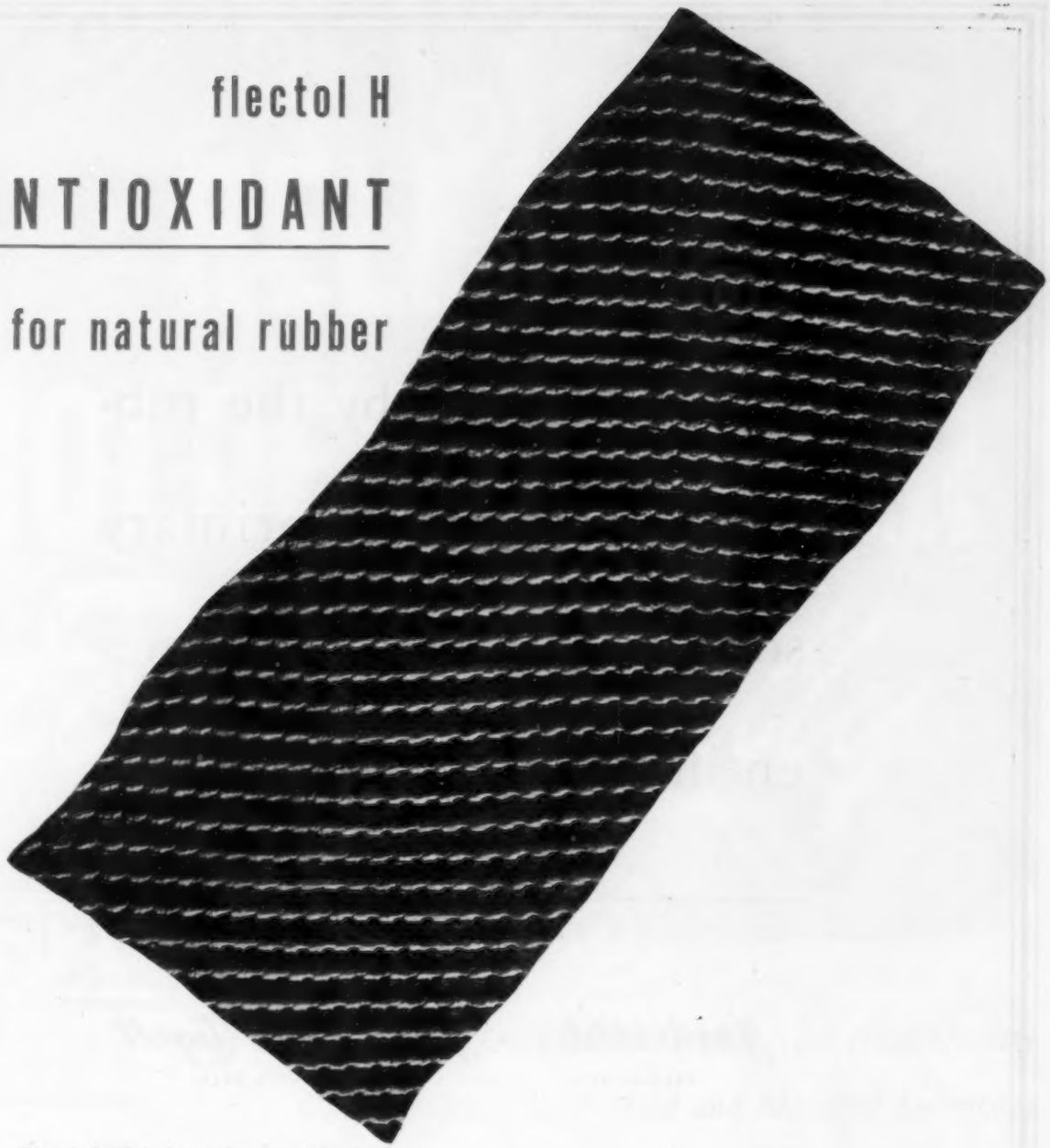
NATIONAL LEAD COMPANY—New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

If it's made with RUBBER ... it's better made with RED LEAD

flectol H

ANTIOXIDANT

for natural rubber



Now that crude rubber is back in increasing quantities, and you can again have your choice of antioxidants, remember

FLECTOL H — Monsanto Antioxidant

Remember, too, that in addition to being a superior antioxidant, FLECTOL H also offers less discoloration and is especially useful where protection against heat deterioration is a factor... If you are interested in antioxidants and accelerators, take advantage of Monsanto's continuing research studies on many rubber products. Also, ask for current literature. Write MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron, Ohio.

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

Recognized by the rubber industry as a primary source for scrap rubber, scientifically sorted and graded

Jack Sider • *J. K. McElligott*
PRESIDENT EXECUTIVE VICE-PRES.

Since 1868

The **LOEWENTHAL** *Co.*

188 W. Randolph St., Chicago 1, Ill. • 159 Clewell St., Akron 5, Ohio • Cable Address: "GYBLOWELL"

RELEASE MOLDED RUBBER *Economically*

USE COLITE CONCENTRATE... *A High Quality Concentrated Liquid Mold and Mandrel Lubricant*

- Results in a shiny, satin-like finish.
- Never builds up on the molds.
- Is extremely *economical.*
- Is non-toxic, non-tacky, odorless.

Write today for further information on the Colite Concentrate way of removing cured rubber and plastics from molds

For brighter white goods, Colite D43D is recommended.

THE BEACON COMPANY
PURITY · UNIFORMITY · DEPENDABILITY
Chemical Manufacturers
97 BICKFORD STREET · BOSTON, MASSACHUSETTS

In Canada: PRESCOTT & CO., REG'D., 774 ST. PAUL ST. W., MONTREAL

A WIDE RANGE OF USEFULNESS

PELLETEX for HOSE

PELLETEX, leading SRF Black is equally important and effective for braided, wrapped, or all-rubber hose. Stocks containing PELLETEX not only tube satisfactorily but hold their shape during processing, age well and impart high resistance to the material conveyed, including steam, solvents and sand.

Our Technical Staff is at Your Service

MANUFACTURER
GENERAL ATLAS CARBON CO.
PAMPA, TEXAS
GUYMON, OKLA.

DISTRIBUTOR
HERRON BROS. and MEYER
NEW YORK, N. Y.
AKRON, OHIO

4 BAKER CHEMICALS of interest to The Rubber Industry

MAGNESIUM OXIDE
(Neoprene Grade)

A very light, finely-divided powder completely uniform in bulk density, particle size, and chemical activity. Calcined in electric furnaces to insure dependable performance when it is compounded with neoprene and other synthetic rubbers.

MAGNESIUM CARBONATE
(Technical Light Powder)

Particular emphasis is placed on uniformity of physical specifications, which reflect in trouble-free compounding of rubber products. Impurities such as iron and calcium are extremely low due to exacting chemical control.

CALCIUM NITRATE
(Technical Crystal)

A high purity chemical especially manufactured to meet the requirements of compounders of latex products. It is produced as creamy-white crystals 1½" and smaller in diameter, containing 3 molecules of water and crystallization.

CARBON DISULFIDE
(Carbon Bisulfide)

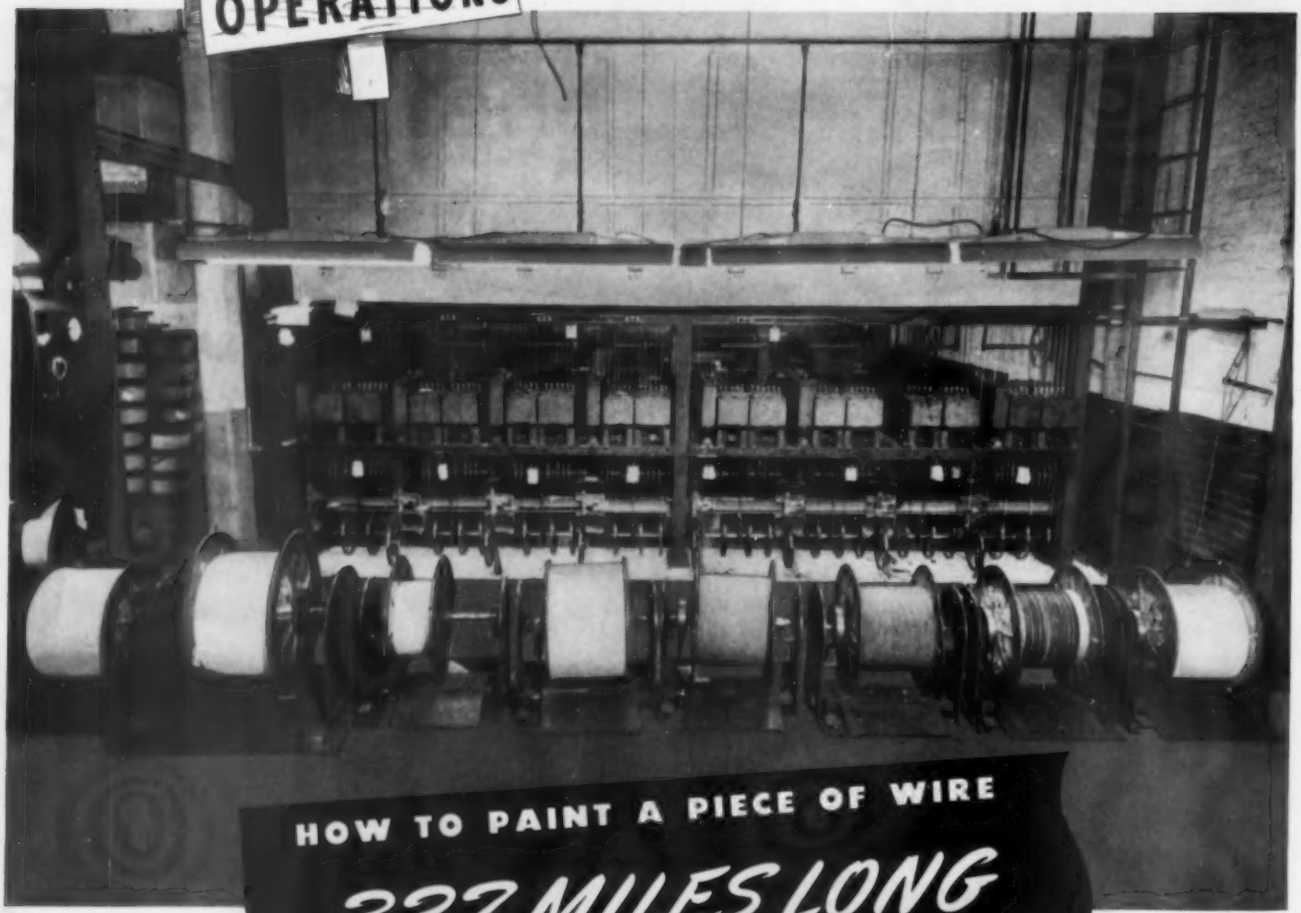
Freedom from other sulfides (Assay of 99.99%) makes Baker's carbon Disulfide a preferred solvent in the rubber industry. Manufacture by a unique electro-thermic method, with continuous rather than batch distillations, insures uniformity.

J. T. BAKER CHEMICAL CO.
Executive Offices: Phillipsburg, N. J.

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Heat at Work...in
CONTINUOUS
OPERATIONS



HOW TO PAINT A PIECE OF WIRE
327 MILES LONG
IN ONE DAY

. . . and paint it not with just one coat, but with 12 consecutive saturating and finishing coats, at the rate of 72,000 feet per hour! A real job for the application of heat in continuous processing operations . . . so the problem was turned over to IOI.

Result: IOI engineers constructed from standard component parts the installation shown above. This specifically designed system delivers 25% more production at 30% less attendant cost, operates over an .010" to .750" diameter range, and produces coated wire that tests higher for luster and concentricity of finish.

This system is typical of IOI's engineering versatility in applying its sound basic principle to the industrial processing of monofilament and web materials . . . *putting heat to work in continuous operations.*

Complete details of IOI installations adaptable to your industry are available in booklet form. Copies will be sent upon request.

INDUSTRIAL IOI ENGINEERING VERSATILITY **OVENS, INC.**

13825 TRISKETT ROAD CLEVELAND 11, OHIO

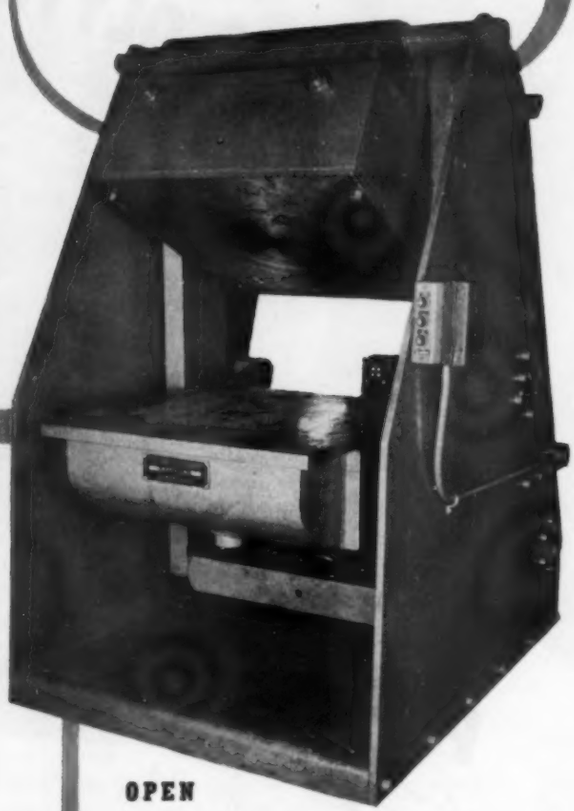
ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON W 1, ENGLAND

3 Star Synthetic Resins—
PICCOLYTE
Widely used for a great variety of applications, Piccolyte is low in cost, non-yellowing, thermoplastic, soluble in low-cost naphthas, chemically inert. Many types and grades.
PICCOUMARON
A series of para-coumarone indene resins, made in grades ranging from liquids to brittle solids. Soluble in low-cost naphthas and other solvents.
PICCOLASTIC
Based on Styrene, Substituted Styrene and Homologues. More than a score of types and grades having different melting points, molecular weights, solvencies and other properties.
PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNSYLVANIA
Plants at Clairton, Pa. and Chester, Pa.
Makers of: Coumarone Resins · Coal Tar Solvents · Styrene Resins · Rubber Plasticizers · Reclaiming Oils · Terpene Resins · High Solvency Naphthas · Solvent Oils.
Distributors to the Rubber Industry STANDARD CHEMICAL CO., Akron, Ohio

STANMOCO
hydraulic toggle presses

EQUIPPED WITH KNOCKOUTS OFFER BIG LABOR SAVINGS

CLOSED



OPEN

Specifications

Platens	34"x 34"
Maximum Opening	14½"
Pressure	200 Tons

Operation: Manual or automatic through use of cycle timers.

Press designed for use with 750 pounds hydraulic oil pressure.

Press can be furnished with or without hydraulic pumping unit.

Special knockouts can be furnished to meet individual requirements.

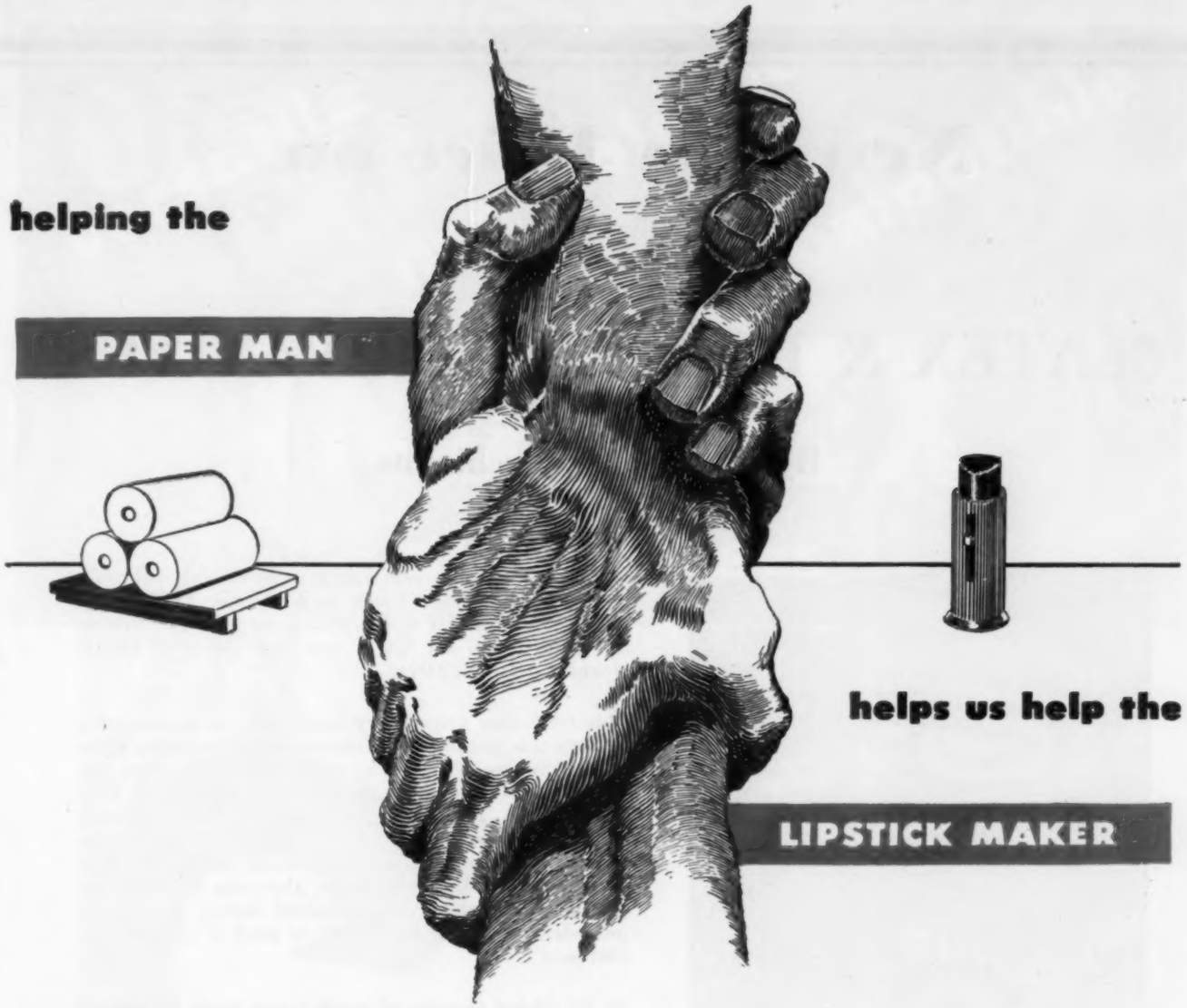
Presses can be furnished complete with molds and knockouts for any special molding job.

Write for complete details

The Akron Standard Mold Co.
Akron — *The Established Measure of Value* — Ohio

helping the

PAPER MAN



helps us help the

LIPSTICK MAKER

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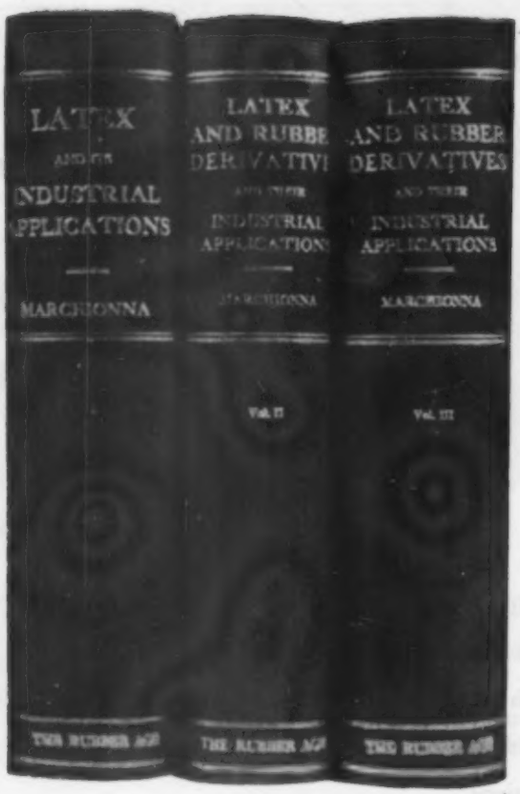

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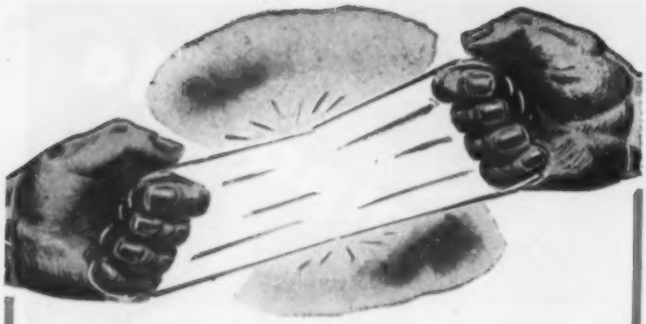

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RUBBER AGE

Vol. 60, No. 5 FEBRUARY, 1947

Mangabeira Latex and Rubber

By NORMAN BEKKEDAHL[1] and WALDEMAR SAFFIOTI[2]

Instituto Agronomico do Norte, Belem do Para, Brazil

THE Mangabeira *(Hancornia speciosa)* is a small tree or large shrub of the Apocynaceae family. It is indigenous to the eastern and southern states of Brazil and also parts of the Amazon Valley. It is cultivated mostly for its fruit (mangaba), which is edible and has an excellent taste. When an incision is made into the bark of this tree, however, it yields a by-product, a rubber-containing latex. Its rubber is known usually as Mangabeira rubber or Pernambuco rubber.

Before World War II there was very little commercial production of Mangabeira rubber, although it had been marketed to some extent before plantation rubber became prominent and when the price of crude rubber was very high. Several factors accounted for this low production. The most commonly used natural rubber, which is obtained from the Seringueira, or Para rubber-tree *(Hevea brasiliensis)**, is superior both in quality and as a general-purpose rubber.

The more effective tapping methods for the Mangabeira are much different from those for the Seringueira and have not yet been as well developed. The methods for coagulating rubber from the latex of Mangabeira are somewhat different from those of the Seringueira and are not generally as well known to the natives or producers.

During the war, however, efforts were made to obtain all the natural rubber possible, almost regardless of cost or quality. According to information made available by E. G. Holt *(1)*, who had charge of all statistical records of the Rubber Development Corporation, Mangabeira rubber was produced during the war years to the total extent of about 2000 to 2500 tons. The use, and consequently the production, of this rubber will probably decrease again to a negligible quantity when normal conditions are resumed unless improved processes are developed for tapping the Mangabeira tree and for coagulating the rubber from the latex, or unless special uses are found or developed which can make use of the softness or other properties peculiar to this rubber.

A thorough study of tapping methods could undoubtedly bring about a greater yield of latex per tree per year with less effort on the part of the producer. The present methods of tapping involve either the cutting of many V-notches in the bark of the tree, not only on the main trunk but also on all the larger branches, or the cutting of spiral grooves in the main trunk which are fed from straight cuts on the branches. The latex flows very freely from these wounds into cups placed just below the V's or at the bottom of the spiral, and within an hour or two a liter or more of latex may be obtained from a single tree.

Note: This article will also be published as a technical bulletin of the Instituto Agronomico do Norte, entitled "Latex e Borracha de Mangabeira," I.A.N. Boletim Tecnico No. 11.

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[2] Present address: Alameda Glette 463, Sao Paulo, Brazil.

* *Hevea brasiliensis* is the botanical name for the Para rubber tree, named after the port of Para at the mouth of the Amazon River through which all the rubber passed in the early days of wild rubber production. In Brazil this tree is more commonly known as the Seringueira, and this term is often used in this paper. It must not be confused with seringueiro, which is the term applied to the person who taps the Seringueira and processes its latex into rubber.

This process is quite different from the tapping of the Seringueira or Para rubber tree, which is tapped usually by making only one straight slanting cut at a time on the trunk of the tree within a few feet of the ground. Each tapping of the Para tree may yield an average of only about 50 to 100 ml. of latex, but this cutting is repeated usually every second day throughout most of the year.

The Mangabeira tree, like the Castilloa, does not produce such a copious quantity of latex at each tapping if the process is repeated at these frequent intervals. Dr. A. W. J. Dyck *(2)* has observed that in Bahia the Mangabeira trees are tapped generally no more than 2 to 3 times per year. The maximum quantity of rubber which a Mangabeira tree can produce during a full year of tapping is not known, but under proper conditions it may possibly yield as much as, if not more than, the Hevea. At least, the amount of labor connected with the tapping of a Mangabeira tree over a period of a year would be considerably less than that with the Hevea.

The coagulating characteristics of Mangabeira latex are much different from those of the Seringueira latex. All of the Mangabeira latices studied by the present authors were found to be very stable with regard to spontaneous coagulation. No coagulations took place from long-time standing under the atmospheric conditions of the tropics. No bacterial action took place causing putrefaction. No coagulation occurred by the addition of acetic or formic acids in concentrations used on the plantations for the coagulation of Hevea latex, which is equivalent to about 1 gram or less of the concentrated acid per liter of the latex. However, if 100 times this quantity of glacial acetic acid is added to undiluted Mangabeira latex the rubber will coagulate. The addition of this large quantity of acid is, of course, not economical or practical on a commercial basis.

Because of possible variations which may occur in the same species of tree in different localities there may be some variations in the minimum quantities of coagulants required for quantitative coagulation. All of the latices studied in this investigation, which were obtained from areas adjoining the lower Amazon, were found to be very stable. Several samples of Mangabeira latex obtained in the Amazon Valley remained stable and fresh after more than a year of standing without the addition of a preservative.

Dr. Dyck *(2)*, who studied methods of coagulating Mangabeira latex which he obtained from the state of Bahia, on the east coast of Brazil, reports that Mangabeira latex is much more stable than Hevea latex. Guimarães and Chaves *(3)*, who worked with Mangabeira latex from southern Brazil, state that no coagulation took place either by fermentation or by the addition of enzymes. It is doubtful, then, whether there is sufficient variability in latices from different areas which would appreciably alter the conclusions arrived at from a study of coagulants from the commercial viewpoint.

The natives of Brazil, who coagulate rubber from Para latex by means of smoking the latex on the end of a stick or paddle, have found that this procedure is not as satisfactory a method for the latex of Mangabeira. They have, however, discovered that ordinary table salt or alum solutions in moderate quantities will separate the rubber from Mangabeira latex, and therefore they use these coagulants in their processing operations.

Mangabeira rubber seems to have gained a bad reputation with the consumer, especially as to its aging qualities. It was therefore thought worthwhile to make a search for other coagulants and to study the rubber produced under various processing conditions. At the same time it was decided to make a few simple analyses and tests on the latex and the rubber of Mangabeira.

A grove of Mangabeira trees which produces Mangabeira rubber, sometimes called Pernambuco rubber. (Photographs are reproduced from 16mm. film.)

Samples of Latex

All of the latex samples used in these experiments were obtained from Mangabeira trees found in various parts of the lower Amazon Valley. On most occasions, representatives were sent out from the Rubber Laboratory to these areas to purchase the latex. The producers, in all instances, claimed there had been no dilution of their latices either through intention or by rainfall.

However, in order to be sure of authentic material —latex that had undergone no adulteration or dilution —for at least some of the experiments, the authors on several occasions procured their own samples, conducting all the operations themselves, such as tapping the trees, collecting the latex, and transporting it back to the laboratory. They collected their samples on the Island of Marajó. The most concentrated sample came from some Mangabeira trees near the city of Ponte de Pedras on this same island. In each case about 5 gallons of the latex were obtained for experimentation.

Experimental Procedure

Directly after reaching the laboratory the latex samples were strained through fine Monel metal sieves in order to remove dirt, bark, and other solid foreign matter which may have been present. Before portions of the samples were removed for experimentation the latex was stirred well in order to be sure of a homogeneous mixture.

All density measurements on the latex samples were made by means of a glass hydrometer which had a range from 0.940 to 1.000. The markings on the scale were 0.001 units, and it was fairly easy to estimate

the next place to within 2 or 3 units. The hydrometer had previously been calibrated by measuring the densities of alcohol-water mixtures, the true densities of which had been determined by weighing known volumes. All density measurements reported in this paper are corrected to or measured at the temperatures indicated, and the units are given in grams per milliliter (g/ml).

For several samples of latex, density measurements were made at various temperatures in order to obtain a value for the thermal coefficient of expansion. For this experiment a portion of the sample was placed in a 2-liter cylinder, and then cooled for about 24 hours in a refrigerator to about 8°C. Then, with constant and rapid agitation (by means of a motor-stirrer) between hydrometer readings, density - temperature data were taken. The warming of the solution was either natural or by an electric immersion heater controlled by a Variac. The usual temperature rise was 10°C. per hour or slower.

Analyses were made on several samples of the Mangabeira latex for both the total solids (T.S.) and the dry rubber content (D.R.C.). In determining the T.S. content a sample of the latex was weighed before and after drying on the surface of a glass or glazed porcelain plate. It was found most convenient to use plates thin enough for low weight and small enough to fit on the pan of an analytical balance.

The latex sample was weighed from a covered weighing flask because evaporation of even a small portion of the latex affects the accuracy of the analytical results. The plates were weighed before the latex was added and after the drying of the latex. The latex should not form too thick a layer on the plate for proper evaporation. Preliminary drying of the latex may take place in the room, either free or by forced circulation of air, but final drying must take place in an oven. A temperature of about 70°C. is quite suitable for drying.

In the present investigation the size of samples varied from 0.5 gram to 25 grams. For the smaller-sized samples much more care is required, and it is recommended that larger samples be used. Samples of about 10 grams each can be handled conveniently and give excellent results.

For the determination of the D.R.C. of the latex several coagulants were tried in varying proportions. Weighed samples of the latex, usually about 100 grams each, were placed in crystallizing dishes, and the coagulating agents added with stirring. In some cases the latex had been diluted with water previous to the addition of the coagulant.

After coagulation was complete, which could easily be determined by the clarity of the serum, and the coagulum was strong enough to handle, it was passed several times between laundry-type wringer rolls for sheeting, during which process plenty of water was used for washing, and then it was hung up to air-dry for several hours. The rubber was then passed through a laboratory-size mixing mill for creping. The resulting creped rubber was placed in an oven at 70°C. until dry. In order to make sure the samples were dry they were usually folded and passed through the mill again to give a fresh surface before the second oven-drying.

A large number of coagulants were originally tried, but only a few of these showed any promise. Therefore most of the study of coagulating agents was concentrated in a few; namely, acetic acid, alum solution, sodium chloride solution, hydrochloric acid, and latex of the Caxinguba tree *(Ficus anthelmintica)*.

Removing a slab of acid-coagulated Mangabeira rubber from the coagulating pan.

In addition to the methods of coagulation just mentioned, which were made for the purpose of analyses only, studies were also made on methods which might be applicable on a commercial scale. For this purpose the coagulations were performed in either galvanized iron or wooden containers of about 24 x 35 centimeters bottom dimension and 12 centimeters in height.

One liter of the undiluted latex was used for each experiment. Sometimes the latices were diluted with water previous to the addition of the coagulants. Stirring took place during the addition of the coagulating agent. After the coagulum had been allowed to stand a sufficient time in order for it to develop strength enough to be handled, it was passed several times between laundry-type wringer rolls for the purpose of pressing into a thinner sheet. Between the pressing operations the rubber was washed thoroughly. It was next passed between ribbed rolls from which the rubber emerged in the usual form of plantation ribbed smoked sheet. It was then either hung up in a ventilated drying-room at 40°C., or placed in a smoke hut at the same temperature until dry. These drying operations usually required from 4 to 7 days.

Only a few different chemical analyses were made on the Mangabeira rubber. It was not necessary to determine the moisture content because all the samples were previously dried. Ash determinations were made by igniting the samples carefully in a muffle furnace according to the directions given in Section 17 of Method D297-41T of the A.S.T.M. *(4)*. The resin content of the rubber was assumed to be the same as the acetone extract determined by the procedure in Section 11 also given in Method D297-41T.

Samples of the Mangabeira rubber, usually 250 to 300 grams each, were compounded on a 6 x 12-inch laboratory-size mixing mill according to Formula II of the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society *(5)*:

	Parts
Rubber	100
Zinc Oxide	6.0
Sulfur	3.5
Stearic Acid	4.0
Mercaptobenzothiazole	0.5

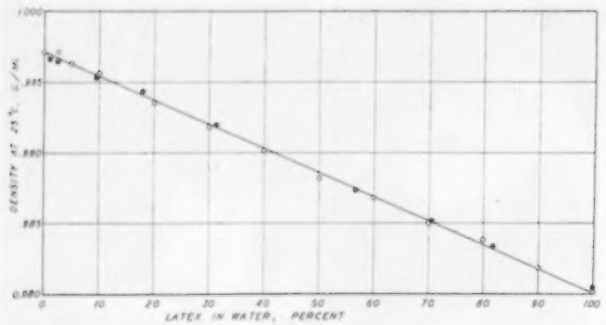

FIG. 1—Density values of a sample of Mangabeira latex at different dilutions with water. The two types of points indicate separate experiments on the same batch of latex.

The compounded rubber was vulcanized at 141°C. in standard molds described in Method D15-41 of the A.S.T.M. *(4)*. Samples were vulcanized for various periods of time, ranging from 15 minutes to several hours, in order to include the optimum conditions of vulcanization for each sample of rubber as determined by the highest tensile strength. In all cases the time for vulcanization of the Mangabeira rubber at 141°C. to the optimum conditions was either 60 or 90 minutes, and more frequently the latter. This rubber is therefore slightly slower curing than the Para rubber.

The vulcanized rubber sheets were cut into dumb-bell-shaped specimens, and the tensile properties were measured by means of a Scott Tester. All tensile values are reported in kilograms per square centimeter (kg/cm^2) of original cross-section of the specimen. Where aging experiments were performed, some of he dumb-bell specimens were aged in a pressure bomb for 48 hours at 70°C. and under 300 lbs./sq. inch (21.1 kg/cm^2) of oxygen pressure. After removal from the aging bomb the rubber specimens were tested for tensile strengths and the results compared with those of the unaged specimens.

Total Solids and Rubber in Latex

The true values of the D. R. C. of several of the latices, which are determined by the method of complete coagulation, are given in the seventh column of Table I. The eighth, or final column, contains the corresponding values for the T. S. as determined by the method of evaporation.

Eight different samples of latices are designated by the letters "A" through "H". The sample "0.5H" is latex "H" diluted 1:1 with water. Sample "37" is a theoretical latex having a density of 0.9748 g/ml at 30°C. Its purpose will be seen later, but it can have no experimentally determined D. R. C. and T. S. The "water", of course, runs zero in D. R. C. and T. S. The "serum" of any latex is also zero in D. R. C. The serum probably would have a T. S. content of about 2 to 3 per cent, but this determination was not made experimentally. The "disperse phase" is assumed to be all rubber and therefore is 100% in both D. R. C. and T. S.

As with latex from the Para tree, the T. S. of Mangabeira latex is 5% to 10% greater than the D. R. C. The serum contains some non-rubber constituents which are not separated from it by the addition of the coagulating agents in the determination of the D. R. C.

Density and Its Relation to Rubber Content

Because of the non-commercial value of Mangabeira in the past there has been very little scientific information published about this rubber. The present authors were unable to find in the literature any data on the physical constants or properties of the rubber or latex. It has been found from experiments performed in this investigation, however, that the D.R.C. and density values for Mangabeira latex are very similar to those for the Para latex. Therefore, for comparisons, a brief survey of a few of the more prominent published investigations made in this field on the Hevea latices will be included in the discussion.

For many years the plantations of the Far East, for control purposes in the field and in the processing factories, have been using density measurements of their Hevea latices as a means of determining their D. R. C. As latex is composed of rubber particles suspended in a serum (and not in true solution) the law of mixtures has been assumed—the volume percentage of rubber in the latex is a linear function of the density.

In order to test the validity of this law of mixtures for latex an experiment was performed in which density measurements were made on a sample of Mangabeira latex for a series of dilutions. The results are plotted on the graph in Figure 1. It can be seen that the concentration of the rubber, or D. R. C., is a linear function of the density, the latter value, after continued dilution, approaching that for water (0.9971 g/ml at 25°C.). This curve could therefore be used to determine the amount of dilution of this particular sample of latex, but it could not be used to determine the D. R. C. of other samples of latex because the rubber particles are not suspended in water but in a serum whose density is not the same as that for water.

Various authors have made contributions to the study of density values versus D. R. C. The results disagree with each other to some extent, but this disagreement is probably within the variations found between different samples of latex. Very few of the authors have defined their units of density or specific gravity, nor have they recorded the temperatures at which these determinations were made.

DeVries *(6)* states that the specific gravity of the serum of Hevea latex varies between 1.016 and 1.025 for different latices, but for calculations he uses a value of 1.020. He accepts a specific gravity of 0.914 for the rubber phase in the latex. The curve on page 40 of his book *(6)* is made linear between these two values on a weight-percentage basis, whereas it should have been on a volume-percentage basis in order to comply with the law of mixtures.

It seems to have been common practice on plantations, because of the high viscosity of undiluted latex, to dilute the latex 1:1 with water before measuring the density, and then to multiply the resulting value of D. R. C. by 2 in order to obtain the D. R. C. of the original latex. DeVries points out that this procedure gives erroneous results because continuous dilution with water causes the density curve to approach the value of water, as is shown in Figure 1, and not the value of the serum. Of course, the accuracy of these results in most instances need not be great because latex is not generally sold on this basis. This type of analysis is made on the plantation in order to determine quickly whether or not the coolies are diluting

the latex before bringing it in, and also in order to determine the approximate extent of dilution of the latex in preparation for coagulation.

Hauser *(7)* states that for the calculations of D. R. C. in the average latex a value of 0.914 may be assumed for the specific gravity of the disperse phase thus giving it a D. R. C. value of 91.4 g/100 cc. Hauser's curve gives the rubber content in grams per 100 cc. on a linear basis between this point and one at 1.020 specific gravity for the pure serum. Scholz and Klotz *(8)* found a lower value of 0.901 for the disperse phase.

Rhodes *(9)*, who experimented with about 850 different samples of latex and probably made more precise measurements under better-controlled conditions than the other investigators, extrapolated an experimentally-obtained linear curve of specific gravity versus rubber content to values below 28% and above 50% of rubber on the weight basis. From this he obtained a density of 1.0177 for the pure serum and 0.9019 for that of the rubber phase. DeVries *(10)* made some calculations using part of the data obtained by Rhodes, and replotted the D. R. C. on a volume basis instead of a weight basis. From these he obtained 1.020 and 0.9065 as the specific gravities of the serum and the disperse phase, respectively.

Rhodes *(11)* later agreed with the latter method of calculation, and recomputed all of his previous data, arriving at the values of 1.0200 and 0.9064 for the extreme points on the curve. Stevens and Stevens *(12)* prepared a table comparing the values obtained by the Rubber Research Institute of Malaya (Rhodes' values) and their own values at the Rubber Trade Association and found them to be in very close agreement.

By repeated electrophoretic depositions of rubber from latex, and redispersing the rubber in ammoniacal solutions, Schmidt and Stamberger *(13)* prepared a rubber dispersion free from its original serum. On progressive dilutions of this final dispersion density values were determined, and an extrapolation of the curve gave a density of 0.905 for the disperse phase at 18°C. After drying the disperse phase its density was measured by the direct determination as 0.909 at the same temperature.

Using 0.000658 per degree centigrade as the volume-temperature coefficient of expansion for rubber *(14)* these densities are calculated to be equivalent to 0.901 and 0.905, respectively, at 25°C., which do not agree very well with the density value of 0.911 g/ml obtained by Curtis, McPherson, and Scott *(15)* which has been suggested by Wood *(16)* as the best value measured for rubber. The previously mentioned values of 0.905 and 0.909 at 18°C. also are equivalent to 0.898 and 0.902, respectively, at 30°C. which is the temperature probably close to the average at which the measurements of density are made on plantations.

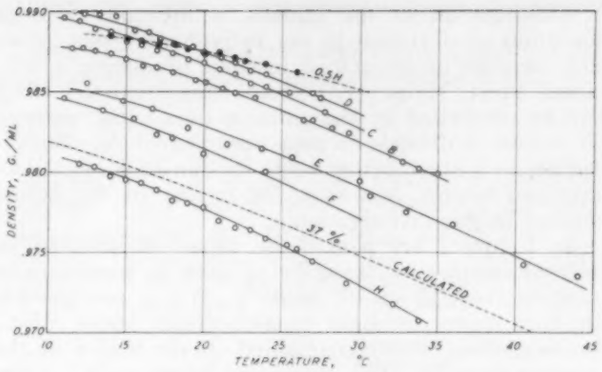

FIG. 2 — Density values of different samples of Mangabeira latex at various temperatures.

The density of 0.911 g/ml for rubber at 25°C., which was previously referred to as the probable best value, is equivalent to 0.908 g/ml at 30°C. This value is in quite close agreement with the value of 0.9064 obtained by Rhodes, who reported that all of his measurements were made at 29° to 30°C. As Rhodes' value comes closest to that obtained by the direct measurement of density of rubber, and as he seems to have done very careful work on many samples of latex of variable composition, his results should be the most acceptable at present. There appears to be no dispute as to the density of the average serum being 1.020. From the equation given by Rhodes the following can be derived:

$$\text{D.R.C.} = \frac{0.9245 - 0.9064D}{0.1136D}$$

in which D is the density of the latex in grams per milliliter at 30°C.

TABLE I—DENSITIES, COEFFICIENTS OF EXPANSION, AND RUBBER CONTENT OF SEVERAL MANGABEIRA LATICES

Sample or Substance	Densities, g./ml. 20°	25°	30°	Coefficient $\frac{1}{V}\left(\frac{dV}{dT}\right)$	D.R.C. % by wt. from Densities	D.R.C. % by wt. by Coagulation	T.S. % by wt. by Evaporation
A	0.9877	0.9861	0.9844	34×10^{-5}	28.8	25.5	...
B	.9856	.9838	.9819	38×10^{-5}	30.9	27.4	30.1
C	.9868	.9848	.9827	42×10^{-5}	30.3	30.4	...
D	.9875	.9856	.9836	40×10^{-5}	29.5	32.1	36.1
E	.9828	.9810	.9791	38×10^{-5}	33.3	33.1	35.5
F	.9815	.9794	.9771	45×10^{-5}	35.0	34.0	36.8
G	.9827	.9806	.9783	45×10^{-5}	34.0	37.3	...
H	.9777	.9755	.9730	48×10^{-5}	38.5	39.7	43.0
0.5H	9876	.9864	.9851	25×10^{-5}	28.2	19.8	21.5
37	.9787	.9768	.9748	40×10^{-5}	37.0	...	...
Water	.9982	.9971	.9957	25×10^{-5}	19.5	0	0
Serum	....	....	1.0200	.....	0	0	...
Disperse Phase	....	....	.9064	.....	100	100	100
Rubber	.9142	.9110	.9077	65×10^{-5}	98.7	100	100

Although all of the authors admit quite a large variation or deviation in the individual results, probably because of interfacial tensions producing a frictional effect, Hauser *(7)* claims this frictional effect can be eliminated by the addition of a small quantity of sodium hydroxide or potassium hydroxide, thus resulting in a much better value for the D. R. C. However, no hydroxide was added to any of the latices studied in this investigation.

In Figure 2 are plotted the values of densities of several samples of Mangabeira latex at temperatures ranging from about 10° to 45°C. It was not possible in most cases to make measurements above 35°C. because some rubber coagulated on the blades of the stirring propeller. This separation of the rubber from the latex, of course, changes the D. R. C. and therefore the density of the latex.

From the curves in Figure 2 the density values of the several samples of latex can easily be read at various temperatures. Values of the densities at 20°, 25°, and 30°C. for the various samples of latex have been determined from a large-scale drawing of these curves and recorded in columns 2, 3, and 4, respectively, of Table I. Densities are reported at 25°C. because this temperature has become the most common for reporting values of physical constants. The 30°C. values are reported because they come closer to being those representing measurements made in the tropical climates of the rubber plantations.

From the densities at 20° and 30°C., fairly good values of the volume coefficients of expansion can be calculated for 25°C. These volume or density coefficients,

$$\frac{1}{V}\left(\frac{dV}{dT}\right) \text{ or } -\frac{1}{\rho}\left(\frac{d\rho}{dT}\right)$$

per degree centigrade are tabulated in column 5 of Table I. The average value for the eight samples of latex, "A" through "H", is 0.00041 per degree centigrade. It can be seen that the dilution of a latex (sample "0.5H") greatly decreases this coefficient.

In a manner somewhat similar to the dependency of the density of a latex on its D. R. C., the volume coefficient of expansion should also be dependent on the D. R. C. In applying this assumption, however, one must know the coefficient for serum and for rubber. The value for rubber, as previously mentioned, is known to be 0.000658 per degree centigrade, but that for the serum has never been measured.

As an approximation to the correct value the coefficient of water, 0.00025 per degree, will be used here. Assuming sample "37" to contain 37% D. R. C. and 63% water, its coefficient is calculated to be 0.00040, which is in good agreement with the average of those measured.

It can be seen, though, from the lack of order of the values of the coefficients in column 5 of Table I that this measurement is not sufficiently precise to allow a calculation of even an approximate value for the D. R. C. It may, however, be valuable in determining whether a latex sample is naturally low in D. R. C. or whether it has been greatly diluted with water. This condition of the latex could probably better be determined from D. R. C. and density measurements.

Figure 3 gives a curve showing the relation between the density of a sample of latex and its D. R. C. calculated from the equation previously given. The points represent experimental values obtained in this investigation for the various samples of Mangabeira latex. In Table I, column 6 gives the D. R. C. of the latices as calculated from the densities. These values are to be compared with those determined by coagulation in the adjoining column to the right. It can be seen from Figure 3 that the deviation of some of the points from the curve is quite great, but for approximate values of D. R. C. the formula given here for the latex of Hevea can be applied to that of Mangabeira.

It will be noted from Table I that the true D. R. C. and the density-calculated D. R. C. for latex "H" are in quite good agreement with each other, but when this latex is diluted 1:1 with water (sample "0.5H") its density-calculated D. R. C. is much too high. This is because of the high density of the serum. In fact, pure water is calculated from the formula to have a D. R. C. of 19.5%.

Sample "37" is plotted in Figure 2 from calculated values of the density at 30°C. for a latex with 37% D. R. C. Values for the curve at other temperatures are calculated by using the coefficients of expansion of the rubber and water in their proper proportion for these other temperatures. The coefficient for rubber is practically constant over this range of temperature for purposes of this calculation, but the coefficient for the water changes so rapidly, especially at the lower temperatures, that the resulting curves for the latices are not linear. The shapes of all the experimental curves are very similar to that of the theoretically-calculated curve "37".

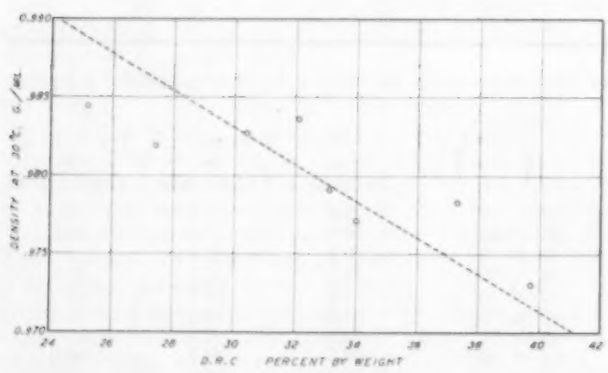

FIG. 3—The dry rubber content of latices as a function of the density. The dotted curve is plotted from data of Rhodes (11) for Hevea latex. The points are experimental values obtained for Mangabeira latex in the present investigation.

Coagulating Agents

As has been stated earlier in this paper, there are a number of coagulating agents which will separate the Mangabeira rubber from its serum, but only a few of these agents have any commercial possibilities. Acetic acid, for example, which is used in a concentration of less than 1% (commercial grade) for the coagulation of latex from the Seringueira or Para tree, must be added in much larger quantities in order to coagulate Mangabeira latex. As shown in Table II, a concentration of 5 ml of glacial acetic acid per 100 ml of latex is not sufficient for coagulation. Usually

twice this concentration is sufficient if the latex has had no previous dilution. However, this is not always true, as in some cases at least 25 ml per 100 were necessary. There is some variability between different latices, but the data given in Table II are typical and close to average.

Complete coagulation can correctly be assumed if the resulting serum is not milky in apearance. Even a very small amount of rubber left in the serum causes it to be noticeably milky. Coagulations with acetic acid, when they do take place, are quite rapid, requiring usually 15 to 20 minutes or less. Acetic acid coagulations give satisfactory results as a laboratory procedure for analysis of the D. R. C. of Mangabeira latex, but too much of this acid is required for industrial processing.

It was found that hydrochloric and sulfuric acids in much smaller quantities coagulate Mangabeira rubber equally well or even better. This can also be seen from Table II. The degree of dilution of the latex does not have much effect on the quantity of acid required for coagulation. If there is no dilution and 10 or 20 ml or more of concentrated hydrochloric acid are added the rubber will coagulate completely, but the physical characteristics of the rubber are changed. For example, the rubber will crumble into small pieces when passed through a mixing mill and will have a slight pungent odor. However, small concentrations of the acid produce a rubber of good quality.

As can be seen from Table II the concentration of the acid in the latex has a great effect on the time of coagulation. Although for the particular sample of latex described in the table, 0.25% of commercial hydrochloric acid in the latex was sufficient for complete coagulation, experience has shown that it is safer to add 0.5%. For the factory coagulations conducted in connection with this work, one liter of water was first added to a liter of the latex, and then 5 ml. of the concentrated acid in 50 ml. of water were added. This produced a satisfactory coagulum which was ready for rolling into sheet form in about 12 hours.

If the latex is not diluted before coagulation, or if the coagulation takes place in too short a time, the resulting coagulum is not as uniform and is much harder, thus making the sheeting process more difficult. Undiluted latex with a high D.R.C. does not leave sufficient liquid for the coagulum to float, and the spongy solid phase together with its absorbed serum occupy the whole space from the surface of the coagulum to the bottom of the container and often sticks to the bottom. If the dilution is too great, or if too long a time is required for coagulation, the resulting coagulum is too weak for proper handling during the sheeting process.

A complete coagulation taking place within a few hours seems to be the most satisfactory. Several hours standing after the completed coagulation is advisable in order to permit the coagulum to harden to a sufficient degree. The proper amount of dilution allows the coagulum to form more slowly and uniformly and also to float on the surface of the liquid, thus facilitating the removal of the rubber phase. This makes the processing operation convenient for tapping and collection in the morning, addition of the coagulating agent in the early afternoon, and sheeting in the late afternoon or following morning.

TABLE II—RESULTS OBTAINED FROM VARIOUS COAGULATING AGENTS ON MANGABEIRA LATEX

Coagulant		Water Added		Complete Coagulating
Type	Quantity ml./100 ml. of latex	ml./100 ml. of latex	Serum Condition	Time Minutes
Glacial acetic acid	5	0	Quite milky	..
	10	0	Clear	20
	10	100	Quite milky	..
	10	200	Very milky	..
	20	0	Clear	20
	20	100	Somewhat milky	..
	20	200	Quite milky	..
	30	0	Clear	15
	30	100	Slightly milky	..
	30	200	Slightly milky	..
Caxinguba latex	2	100	Somewhat milky	..
	4	100	Clear	60
	8	100	Clear	25
Hydrochloric acid	0.1	100	Somewhat milky	..
	.25	100	Clear	600
	.5	100	Clear	29
	1	100	Clear	11
	2	100	Clear	2
	4	100	Clear	1

Latex from the Caxinguba tree* *(Ficus anthelmintica)* acts as a coagulating agent for the latex of Mangabeira. The Caxinguba is a tree found in the tropics of Brazil, in no great concentration in any one area, but quite widely distributed. Its latex can be recommended as an excellent coagulant for the latex of Mangabeira if the two trees are found in the same area. A lack of rapid and dependable transportation in the rubber-growing areas may prevent the relatively unstable Caxinguba latex from being transported over any great distances.

The latex to be coagulated can be diluted 1:1 with water, and the Caxinguba latex added either in its original or diluted state. About 5% concentration of latex is recommended, or about 50 ml. per liter of Mangabeira latex. Incidentally, the latex of Caxinguba is also a very good coagulant for the latex of the Hevea, a much lower concentration of the coagulant being required than for Mangabeira.

Alum solutions and sodium chloride solutions have been the coagulating agents used by the natives in the production of the Mangabeira rubber. These salts were studied as coagulants in this investigation by adding them as 10% solutions. Both coagulants gave a nice-looking coagulum which sheeted easily. The amount of coagulating agent usually used to insure complete coagulation was about 100 ml. of the 10% solution per liter of the latex.

As stated earlier in this paper, partial coagulation of the rubber from Mangabeira latex may take place from agitation even though it is quite mild such as is found in stirring operations. In attempts made to concentrate the latex by means of a centrifuge, coagulation always took place. Guimarães and Chaves *(3)* reported that their Mangabeira latex could be coagulated by means of vigorous agitation. It therefore seems quite probable that a successful commercial method may be developed based on this principle.

* Hugo Borborema, under the supervision of Dr. Felisberto C. de Camargo, Director of the I.A.N., found that the latex of Caxinguba was effective as a coagulant for the latex of Mangabeira. Their experiments were conducted at the latex processing factory of the I.A.N., and further study of this method of coagulation was turned over to the Rubber Laboratory.

Chemical Composition of the Rubber

Not all of the samples of rubber were analyzed, but Table III shows the averages of the results available. The resin content of the Mangabeira rubber, which in most cases runs from 10 to 13 per cent, is higher than that for the Hevea rubber, which is usually below 4 or 5 per cent. The resin content is higher for a rubber prepared from latex by evaporation. This indicates that in ordinary coagulation some of the resins remain in the serum.

In the five samples for which determinations of both D.R.C. and resins were made there is indicated a trend that latices having a higher D.R.C. yield a rubber of lower resin content. Whether or not this is generally true must be proved by similar analyses on many more samples of latex.

The ash content of Mangabeira rubber (Table III) averages 0.2 per cent, which is about the same as that usually found in Para rubber. In a few instances, however, when the Mangabeira rubber was coagulated by means of sodium chloride, the ash content was higher (0.4 to 0.6%). This would be expected because of the difficulty of washing out completely the coagulant from the coagulum. No doubt an alum coagulation leaves an equivalent amount of alum in the rubber, but this does not show up so strongly in the ash because over 70 per cent of the absorbed alum would be lost during the ignition process.

More detailed analyses on Mangabeira latex and rubber were made by Guimarães and Chaves and published earlier *(3)*.

Physical Properties of the Rubber

In order to evaluate the Mangabeira rubber, especially as to its aging properties, tensile tests were made on both aged and unaged vulcanized samples. Also, samples of the Mangabeira rubber coagulated by different means were tested and compared with a typical sample of Hevea rubber.

Figure 4, which contains curves made from average values obtained from a number of tests and samples, shows that the Para rubber has higher tensile properties than the Mangabeira. The Mangabeira rubber coagulated with Caxinguba latex or with dilute hydrochloric acid gives tensile properties superior to those of samples which have been coagulated with acetic acid or alum. The alum-coagulated rubber has the poorest properties of all.

Actually this evaluation may quite easily have been indicated without vulcanizing the rubber and determining its tensile properties. Rubber coagulated with

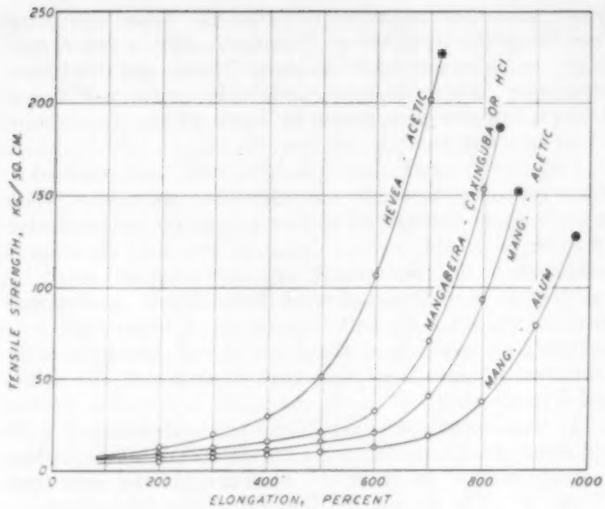

FIG. 4 — Tensile properties of vulcanized Hevea rubber coagulated with acetic acid compared with Mangabeira rubber coagulated by different agents.

alum is somewhat tacky and becomes much more so within several weeks time. The rubber coagulated with acetic acid is also tacky but to a less degree. The rubber coagulated with the latex of Caxinguba or with dilute hydrochloric acid exhibits no tackiness even over a period of a year or more.

The pinkish appearance which is characteristic of Mangabeira latex is transferred to the rubber in all of the processing methods described here. Mangabeira rubber can usually be distinguished from other types of rubber by this color.

Samples of unvulcanized Mangabeira rubber coagulated by dilute hydrochloric acid or by Caxinguba latex have been kept around the laboratory for over a year without any appreciable visual aging as is indicated by their lack of tackiness. The other coagulants, especially the alum or the sodium chloride, cause the rubber to age quite rapidly. In less than one year the rubber becomes so sticky that it seems almost worthless. It no doubt is this poor aging quality that has given the Mangabeira rubber its bad reputation.

Laboratory aging tests were made by means of the oxygen bomb as previously described. The stress at break for Mangabeira rubber coagulated with the Caxinguba or dilute hydrochloric acid in all cases decreased no more than 50 per cent during the aging process. The rubber samples coagulated with the salts became so badly oxidized and brittle that in some cases they broke in pieces when bent by hand. Usually they were too weak to test on the Scott Tester. A few that had enough resistance to be tested were found to have deteriorated from 80 to 90 per cent.

In all coagulations the rubber was thoroughly washed during the sheeting process. However, chemical analyses of the rubber indicated that the coagulating agents used in these experiments were not removed completely. It would seem out of the question to expect commercial washing to be more effective than these small-scale operations in freeing the rubber from the small quantities of the coagulants or their impurities which are probably the cause of the poor-aging qualities of the Mangabeira rubber.

TABLE III—RESULTS OF ANALYSES ON DRY COAGULATED MANGABEIRA RUBBER

Sample	Resins(%)	Ash(%)
B	10.6 [a]	0.17
C	11.5	.20
D	13.3	.17
G	7.3	.29
H	6.7	...
I	12.8	.14
J	9.3 [b]	.13

[a] 13.0% resins on a sample of evaporated latex.
[b] 13.4% resins on a sample of evaporated latex.

Summary and Conclusions

1. Of a number of samples of latex of Mangabeira investigated, the D.R.C. values ranged from 25 to 40 per cent, the average being about 33 per cent.

2. A rough value of the D.R.C. of Mangabeira latex can be obtained by measuring its density and applying the same tables which are used for latex of the Seringueira or Para rubber tree, assuming the law of mixtures on a volume basis, the density of the serum as 1.020, and the density of the disperse phase as 0.9064 g/ml at 30°C.

3. The volume coefficient of expansion for the average Mangabeira latex which runs from 30 to 40 per cent D.R.C. is about 0.00041 per degree centigrade.

4. Both for laboratory analyses for the D.R.C. and for commercial coagulation of Mangabeira latex the best coagulants are either dilute hydrochloric acid (about 0.5%) or the latex of Caxinguba (about 5%).

5. Alum and sodium chloride solutions, both of which at the present time are used as coagulating agents in the commercial production of Mangabeira rubber, have a degrading effect on the resulting product, both unvulcanized and vulcanized.

6. The resin content of the Mangabeira rubber runs usually from 7 to 13 per cent, most values being closer to the latter. The ash content is usually quite low, about 0.2 per cent.

7. The optimum conditions for vulcanization of Mangabeira rubber, as determined by the highest tensile strength, are from 60 to 90 minutes at 141°C. when compounded according to Formula II of the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society.

8. Mangabeira rubber is softer and weaker than Hevea rubber, but with the improved methods of processing, the physical and aging properties of the Mangabeira rubber have been greatly improved, and this rubber may find commercial applications in the future, especially as a special-purpose rubber.

9. There are possibilities that still another method of coagulating rubber from Mangabeira latex may be developed making use of vigorous agitation.

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Research on Pneumatic Tires for Farm Tractors. (Publication No. 64). Issued by the British Rubber Producers' Research Association, Welwyn Garden City, Herts., England. 5½ x 8½ in. 36 pp.

This is a report of work on pneumatic tires for farm tractors carried out in 1939-40 by the Institute for Research in Agricultural Engineering of the University of Oxford for the B.R.P.R.A. Pressure of work has prevented earlier preparation of this final report, although an interim report was issued in 1939. The work was intended to show the effect of diameter, loading, section and inflation pressure on the over-all efficiency of pneumatic tires under as varied conditions as possible. The results are given in the form of over-all efficiency and slip efficiency curves plotted on a basis of draw bar pull and, from the over-all efficiency curves, the results of all the tests carried out with the largest and smallest tires are presented as over-all efficiency curves plotted on a basis of draw-bar pull divided by estimated live back axle weight. This latter presentation gives a better picture of the results over a wide range of conditions and enables an estimate to be formed of what may be considered to be a reasonable maximum working drawbar pull for any size of tire over a range of live back axle weights.

Dag Colloidal Graphite. Acheson Colloids Corp., Port Huron, Mich. 11 x 8½ in. 16 pp.

Applications of the company's special colloidal graphite material in lubrication, parting, surface coating, impregnation, and similar purposes, are briefly discussed in this attractive, three-color booklet. High-temperature, low-temperature and dry lubrication is covered. Five specification tables covering dispersions in water, oil, hydrocarbons, alcohol and special organics are also included. Interpretations of the 19 fundamental properties of colloidal graphite are given. Illustrations of specific applications are shown.

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Plasticizer 3. (Bulletin No. 14). Amecco Chemicals, Inc., 60 East 42nd St., New York 17, N. Y. 8½ x 11 in. 14 pp.

Some interesting technical information on Plasticizer 3, a new plasticizer, tackifier, extender, processing aid and dispersing aid for natural and synthetic rubbers, is contained in this report. The nature and properties of the material together with general rules for its use in rubber compounds are briefly described. Data on the behavior of the material in GR-S and nitrile rubber compounds is also shown.

The Action of Safety Fuel Hydrocarbons on Perbunan Compounds

By R. M. HOWLETT[1] and E. N. CUNNINGHAM[2]

THE use of safety fuels in commercial aircraft is a topic of current interest. In this connection, the manufacturers of aircraft parts are concerned with the possible action of the components of this type of fuel on rubber compounds. Safety fuels *(3, 9)* are made from specially selected or synthesized hydrocarbons which are blended together to produce a high anti-knock quality gasoline with a minimum flash point of 100°F. The subject of this article is the effect of these hydrocarbons on the oil-resisting synthetic rubber used in fuel tank liners, hose, seals and diaphragms which are present in aircraft fuel systems.

Experimental

A study has been made on the effect of hydrocarbons in the safety fuel boiling range (approximately 300 to 400°F.) on the volume increase of compounds made from the three Perbunans. These oil resisting synthetic rubbers are Perbunan 18, Perbunan 26, and Perbunan 35, which contain respectively 18, 26 and 35% acrylonitrile in the polymerization mixture. The base compound used with these polymers is contained in Figure 1.

The fuel blends were made from two components, one a paraffinic material, and the other an aromatic. Inspection data were obtained on the two components. In addition, two experimental safety fuels, ASTM Reference Fuel No. 1*(1)*, a blend of 50% ASTM Reference Fuel No. 1 and 50% ASTM Reference Fuel No. 2 *(1)*, and ASTM Reference Fuel No. 2 were used as immersion liquids. Aniline points and specific gravities were obtained on all immersion fluids.

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[2] Enjay Company, Inc., 26 Broadway, New York 4, N. Y.
Note: Perbunan is the registered trade mark of the Enjay Company, Inc.

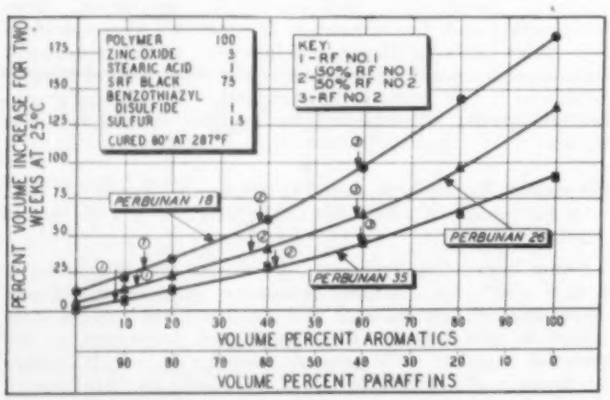

Figure 1

TABLE I—INSPECTION DATA ON COMPONENTS OF THE BLENDS

Distillation[1]	Paraffinic Material (Iso-paraffins)	Aromatic Material (Alkylated Benzenes)
Initial Boiling Point, °F.	339	325
10% Boiling Point, °F.	344	329
50% Boiling Point, °F.	348	333
90% Boiling Point, °F.	350	336
Final Boiling Point, °F.	372	350
A.P.I. Gravity[2]	56.0	29.4
Flash Point °F.[3] (Tag, Closed Cup)	114	119
Aniline Point,[4] °F.	187.4	Below Freezing Point
Bromine Number; cgms./cc.	3.5	0.7
Refractive Index, 20° C.	1.42205	1.5030

[1] ASTM D 86-40; [2] ASTM D 287-39; [3] ASTM D 56-36; [4] ASTM D 611-44T.

Volume increase values were obtained in duplicate by a modification of ASTM D-471-44T*(1)*. The modifications consisted of using a Jolly Balance and weighing the sample in air rather than in a weighing bottle. Volume increase determinations were made at weekly intervals, measurements being discontinued when conditions of equilibrium were reached, or when the samples had been immersed for five weeks. The hydrocarbon media used in the swelling tests were maintained at 25°C.

Results

Inspection data on the paraffinic and aromatic components are contained in Table I, and the aniline points and specific gravities of all liquids used are found in Table II. Calculated Diesel Index values are also contained in this table.

Volume increase results obtained after two weeks immersion at 25°C. have been plotted against the composition of the blends. These data appear in Figure 1. As previously shown *(8)*, swell is proportional to the aromatic content of the blends.

As a guide, swell data after immersion in ASTM Reference Fuel No. 2 (SR-6), ASTM Reference Fuel No. 1 (SR-10), and a 50-50 blend of the two have been indicated on the graph. This indicates that the blend containing 60% of aromatics produces volume increase values nearly equivalent to those obtained in ASTM Reference Fuel No. 2. Blends containing between 10 and 15% aromatics show swell equivalent to ASTM Reference Fuel No. 1 (SR-10).

These test fuels were designed to include the maxi-

mum and minimum swelling effects which will be produced on synthetic rubber by commercial aviation gasolines. No. 1 produces results of the same order as low swelling gasolines of the highly paraffinic type, and No. 2 has a severe swelling action on synthetic rubber. This latter fuel exceeds the swelling action of fuels currently employed. At the time of its adoption, it was designed to have as high a swelling power as any fuel which would logically be made.

These reference fuels have been widely used in specifications and development work. As a result there is a large amount of information available on their action on oil resisting synthetic rubber, and these data have been correlated with the success or failure of parts in actual service.

In a safety fuel of high paraffinic content, the swell values are lower than for Reference Fuel No. 1. This would indicate that if the synthetic rubber compound contains extractable plasticizer, sufficient care should be exercised to insure that no shrinkage occurs if the part is used to maintain a seal. The question of shrinkage appears to be one problem raised by the use of safety fuels. The use of compounds with low plasticizer or the use of blends containing rubber, GR-S*(2)*, reclaim rubber, or a vulcanizable plasticizer can solve this part of the problem. Perbunan 18 compounds should be attractive in this type of application, as compounds can readily be designed which will show positive swell in the highly paraffinic fuels. These compounds will have the advantage of good flexibility at low temperatures.

Safety fuels with aromatic contents greater than 60% produce quite high swell values. Applications involving fuels of this type will necessitate the use of butadiene-acrylonitrile polymers high in acrylonitrile content. Perbunan 35 is an example of such a polymer. If the trend in safety fuels should be toward extremely high aromatic contents, modified polymers could be developed for this service if desired.

In Figure 2 Diesel Index has been plotted against the logarithm of volume increase in a manner suggested by Fraser*(4)*. The swell values on these compounds have been indicated after both two and five weeks immersion. Swelling results obtained on Perbunan 26 with ASTM Reference Fuels and experimental safety fuels have also been placed on the graph.

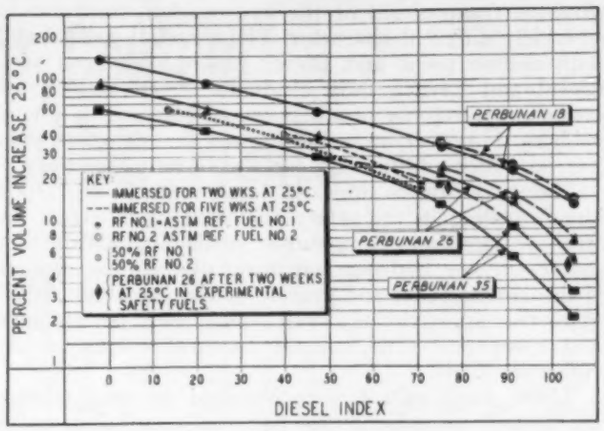

Figure 2

These curves differ somewhat from those of Fraser's. In the first place, only in the range of high aromatic contents do the curves appear to be linear; and second, the points for reference fuels fall below the line of the safety fuel blends. The non-linearity of the curves in the highly paraffinic range may be partially explained on the basis that five weeks at 25°C. is insufficent to produce maximum swell in the Perbunan stocks. A similar experimental condition was suggested by Fraser to explain why the swell produced by isooctane was considerably below the extrapolated curve of log of volume increase vs. Diesel Index of a variety of gasolines.

There is some evidence to indicate that the highly paraffinic blends have not produced equilibrium swell in five weeks at 25°C. Because one problem involved in the use of paraffinic hydrocarbons appears to be that of shrinkage, swell data at relatively short time periods have a greater bearing on the subject than do equilibrium values obtained after extremely long exposure. For this reason immersion tests were discontinued after five weeks.

The values for the two experimental safety fuels fall on the curve for Perbunan 26. These fuels are similar in structure but not identical chemically with the blends which have comparable Diesel Index values. However, the swells for the reference fuels do not fall on the curve for Perbunan 26. This latter fact had been previously observed. It was found *(7)* that these reference liquids produced lower swell values on neoprene when their actions were compared to the volume increase results produced with gasolines of similar Diesel Index. It will be seen from the following discussion that this type of correlation appears to have some limitations, which, at the present time, are not completely understood. It is beyond the scope of this article to explain these anomalies.

Fraser correlated Diesel Index with swell for kerosenes *(4)* and gasolines *(5)*. In this work the same compound of synthetic rubber and the same immersion conditions were used with each class of fuels. When data from these two studies are plotted on the same graph, the curve for the kerosenes lies considerably below that of the gasolines. This would indicate that the Diesel Index-swell relation may not hold if the

TABLE II—COMPOSITION AND INSPECTION DATA ON IMMERSION MEDIA

Blends [b] (by volume) % Paraffins	% Aromatics	Specific Gravity	A.P.I. Gravity	Aniline Point, °F.	Diesel [a] Index
100	0	.7547	56.0	187.4	105.0
90	10	.7645	53.6	170.8	91.4
80	20	.7796	50.0	150.8	75.4
60	40	.8044	44.4	106.5	47.2
40	60	.8304	38.9	56.1	21.9
20	80	.8550	34.0	—6.0	—2.0
0	100	.8794	29.4	(*)	
Experimental Safety Fuels					
No. 5471 [c]		.7745	51.2	148.8	76.2
No. 5482 [d]		.7507	57.0	182.3	104.0
ASTM Reference Fuels					
No. 1	....		64.7	109.4	70.8
50% No. 1—50% No. 2	....		56.8	71.4	40.5
No. 2	....		50.25	27.0	13.6

[a] Diesel Index $= \frac{\text{A.P.I. Gravity} \times \text{Aniline Point (°F.)}}{100}$; [b] See Table I for Inspection Data; [c] 20% aromatics; [d] 100% iso-paraffins; [e] Below Freezing Point of Aniline.

chemical composition of the hydrocarbon mixtures is of widely different character. The correlations of swell with aniline point and Diesel Index have been very useful and have greatly aided in understanding the action of petroleum products on oil resisting synthetic rubbers. However, it would appear that this is a subject on which additional work should be undertaken.

The two graphs indicate how some hydrocarbon blends boiling in the safety fuel range will affect the swell of Perbunan compounds. In dealing with a new safety fuel, or hydrocarbon blend of the type studied, if the aniline point and gravity of the liquid are available, the approximate swell value may be obtained and compared with volume increase values in the reference fuels.

These swell values were obtained on unplasticized compounds containing 75 parts of semi-reinforcing furnace black. If the experimental volume increase (V) is divided by % polymer by volume in the compound (P) and then divided by 100 the % volume swell of the cured polymer (K) is obtained *(6)*. Knowing this latter value, the volume increase of other compounds, having approximately the same states of cure and reinforcement, may be calculated. If the stocks contain plasticizer, volume increase may be calculated by using plasticizer extract coefficients. For practical work it is believed that extract coefficients previously determined for gasolines *(6)* may be used.

By the use of % volume swell of cured polymer and extract coefficients, approximate volume increase values may then be calculated for a wide variety of stocks. From experience, it has been found that such information is of considerable value to the rubber technologist, particularly in the planning stage of a project.

ACKNOWLEDGMENT

The authors wish to thank M. Lapeyrouse of the Research Division, Esso Laboratories, for the safety fuel components used in this work and for his helpful suggestions. They also wish to acknowledge the assistance of Mrs. E. J. Guise and Mrs. C. C. Maddox in securing the experimental data.

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Develop New Reclaiming Process

A NEW rubber reclaiming process, which is reported to skip several steps used in the ordinary reclaiming procedure, is currently being used in the recovery of rubber from airplane fuel cells by the Summit Industrial Products Company of Akron, Ohio. According to Dr. Paul J. Dasher, president of the company, up to 70 percent of the rubber is being reclaimed from each fuel cell, and the rubber recovered can be successfully used anywhere that high quality reclaim can be used. The company is also reported to have produced a top grade sponge rubber which has scores of uses in the automotive products field.

Although little information has as yet been revealed with regard to the process being used by Summit Industrial Products, the company points out that during the war, when the need for rubber was greatest, there was no known method of reclaiming rubber from airplane fuel cells. These cells have considerably more reclaim rubber value than comparable tonnages of scrap tires, according to Dr. Dasher, who estimates that about 70 pounds of rubber compound can be obtained from 100 pounds of fuel cells. Of this amount, 95 per cent is said to have a high rubber value. By comparison, 100 pounds of scrap tires nets about 50 pounds of rubber compound, with about half of that usable as a replacement for rubber.

Dr. Dasher formerly was associated with the B. F. Goodrich Co. as director of fuel cell development and engineering. E. M. Scharenberg, a former Goodrich project engineer, and Donald E. Richard are other officers of the new reclaiming company, which is said to operate plants in Akron and Peninsula, Ohio.

Calender Wind-Up Guards

IN one plant a safety cable connected to a switch which stops the calender wind-up is installed about ten inches from the floor in front of the calender. The cable is placed in this position for the following reasons:

1. The rolls are wound on a shell which is about thirty inches from the floor.
2. All the wind-up accidents occurred on the start of the load or while the roll was still small.
3. The man caught would be in a stooped position, and the cable at this location is in the most convenient place for him to reach.
4. If both hands are caught, the cable can be kicked by the foot.

All back tenders are instructed not to use their finger tips to tuck in the end of the cloth. Instead they are to use the heel of the hand with the fingers extended upward, and follow up with the forearm to hold the cloth next to the shell when making roll changes.

All employees who work on the wind-up are forbidden to wear gloves while working on the wind-up. All double edges are removed at a point ahead of the wind-up.

This procedure requires close supervision to see that the safety cable is in place at all times except during the time the roll is being taken away from the machine.

Rubber Safety Letter

Minor Element Content of Rubber and Rubber Plants

By J. McGAVACK

General Laboratories, United States Rubber Co., Passaic, N. J.

IT has been known for many years that small amounts of copper manganese, and, in many cases, iron, caused deterioration of rubber and rubber products. Maximum amounts allowable for these elements have frequently been specified. During the war when natural rubber was very scarce it was necessary to scrutinize many samples which ordinarily would not find their way to the market. For this reason, during that period a great number of minor element determinations were carried out on various types of rubber and rubber plants. The work was done with a conventional Baird grating spectrograph having a dispersion of 5.6 Angstrom units per millimeter, and the results are reported briefly below.

Using the Baird spectrograph, in metal analyses or in those cases where the sample to be tested is homogeneous in nature, close checks are the rule. For rubber samples not milled or otherwise mixed, too close accuracy can not be expected. In Table I check analyses on two samples of guayule rubber are given.

In Table II values for the more important latex coagulated rubbers of commerce are given. It will be noted that US-F rubber shows a very low percentage of minor elements.

Table III gives minor element values from such rubbers as guayule, kok-saghyz, cryptostegia, goldenrod,

TABLE I—CHECK ANALYSES ON TWO SAMPLES OF GUAYULE RUBBER

	Parts/million		
	Cu	Mn	Fe
Guayule I	4.9	12	760
	4.6	11	740
	4.5	10	700
	5.6	11	770
	4.0	11	750
Guayule II	7.4	14	790
	7.0	14	800
	7.2	14	750

TABLE II—VALUES FOR THE MORE IMPORTANT LATEX COAGULATED RUBBERS OF COMMERCE

Type	Commercial Types Description	Parts/million Cu.	Mn.	Fe.
US-F	Average value	1	0.5	25
Smoked Sheet	Average value	0.7	1.6	20
Castilloa	Well washed	3	0.2	120
GR-S	Average value	2.9	0.1	40
African Wilds	Average value	3.5	36.0	760

TABLE III—MINOR ELEMENT VALUES FROM VARIOUS RUBBER-BEARING PLANTS

Name	How Prepared	Parts/million Cu.	Mn.	Fe.
Guayule	Salinas—Spence Mill	6	10	450
	Av. Six Commercial Samples	6	10	660
	Retted Shrub E.R.L.[1]	4	13	270
	Unretted Shrub E.R.L.[1]	2	7	250
	NH_3 Stearate Treated E.R.L.[1]	8	4	140
	Heated 1% NH_3 E.R.L.[1]	2	2	920
	Ext. Alc. Soda (91% HC) I.R.C.[2]	3	4	220
	Ext. Alc. Soda (95% HC) I.R.C.[2]	4	2	340
	Defoliated	3	9	180
	Undefoliated	5	3	490
Kok-Saghyz	Worms washed hot water E.R.L.[1]	4	15	360
	Un-deresinated E.R.L.[1]	2	21	—
	De-resinated E.R.L.[1]	6	8	—
Cryptostegia—G	Latex Coagulum—Yuma	6	2	27
M	Latex Coagulum—Costa Rica	11	23	195
G	Tip Bleeding—Haiti	1.4	3.7	76
G	Tip Bleeding—Haiti	1.2	3.7	73
G	Green Clippings—Ensiled Yuma	2.8	2.0	290
G	Dried Clippings—Ensiled Yuma	5.0	2.0	210
G	Latex (tip bleeding) Non-defoliated—Yuma	8.0	3.0	110
G	Latex (tip bleeding) Defoliated—Yuma	43.0	6.0	260
Goldenrod	Autoclaved Acid Base Mech. Separated	15.0	20.0	22
	Autoclaved Separated by Solvent	5.0	2	6.0
Milkweed	Subulata Solvent Ext. (Ariz.)	2	26	35
	Subulata Solvent Ext. (Ariz)	3	17	40
Rabbit Brush	Solvent Ext. (Nevada)	37	16	620
	Mechanical Ext. E.R.L.[1]	140	32	1300

[1] Eastern Regional Laboratory. [2] Intercontinental Rubber Co.

TABLE IV—DISTRIBUTION OF THE MINOR ELEMENTS IN THE TISSUES OF THE VARIOUS PLANTS

		Parts/million		
		Cu.	Mn.	Fe.
Goldenrod (Solidago)	Unground leaves	57	111	376
	Ground leaves	6	113	70
	Ground leaves leached with H_2O	51	120	390
	Ground leaves leached with 3% H_2SO_4	31	4	38
Cryptostegia—G	Ground leaves—Arizona	9	20	290
G	Ground leaves—Arizona—Acid base ext.	13	7	48
G	Ground leaves—Texas	16	70	1020
G	Ground leaves—Calif.	21	28	1000
G	Ground stalks—Texas	16	69	160
H	Ground stalks—Florida	7	11	140
H	Ground leaves—Florida	94	105	375
M	Ground cuttings—Costa Rica	11	27	2050
Kok-Saghyz	Ground roots—Paramus, N. J.	7	6	300
Guayule	Ground roots (Av. 20 locations)	3.8	10.3	418
	Ground leaves (Av. 20 locations)	7.9	39	707
Milkweed (Subulata)	Ground whole plant—Ariz.	11.0	150	170
Dogbone	Ground whole plant—Col.	10.0	21	420
Apocynum	Ground whole plant—Ariz.	8.0	48	280
Spurge	Ground whole plant—Dover	14	150	3100
Rabbit Brush	Ground whole plant—Nev.	15	11	240
Ansonia	Leaves unground	3	39	140

milkweed, and rabbit-brush. Here again it will be noted that where latex methods have been used to obtain the rubber, low quantities of minor elements are found. Where mechanical methods have been used, large quantities are generally present. This fact pretty well explains why it is necessary to add an antioxidant during the preparation of guayule and kok-saghyz.

Table IV gives the distribution of the minor elements in the tissues of the various plants. It actually shows that mechanical methods introduce these elements into the rubber.

In Table V a very interesting fact is brought to light in showing that when guayule is grown without being irrigated both the roots and the upper plant tissues contain more iron than when it is grown under suitable irrigation.

Sackett showed that phenyl b-naphthylamine retarded the aging of a vulcanized rubber stock containing copper or manganese. In the work reported here it has been found that Tonox (p-p'-diamino diphenyl methane) when incorporated in any one of the many crude rubbers, prevents deterioration over long periods of time; that is, viscosity and curing rates do not change. Such a chemical should be very useful in the preparation of guayule or kok-saghyz rubber.

For those who wish to carry out experimentally determinations as described in this memorandum, it would be well to refer to the article by Hampton and

Mexican chilte plants grown at U. S. Rubber's greenhouse at Paramus, N. J.

Campbell on the "Measurement of Spectral Intensities in the Direct Current Arc." To be brief, the rubber samples were ashed directly in a prepared electrode and then arced.

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TABLE V—EFFECT OF IRRIGATION ON MINOR ELEMENT CONTENT OF GUAYULE PLANT

		Non-irrigated	Irrigated
Ground Dry Leaves			
Cu	ppm	8.0	7.8
Mn	ppm	40.0	38.0
Fe	ppm	1095	319
Ground Dry Root			
Cu	ppm	3.3	4.3
Mn	ppm	10.2	10.5
Fe	ppm	454	381

RECENT ADVANCES IN THE PHYSICS AND CHEMISTRY OF RUBBER

4—Molecular Resonance and Its Bearing on the Chemistry of Rubber and Related Compounds

By L. BATEMAN

British Rubber Producers' Research Association, Welwyn Garden City, Herts., England

AN IMPORTANT contribution to the rapid and general appreciation of the theories of molecular structure developed chiefly by Lewis and by Langmuir between 1915-20 was the ready expression of the concepts in simple physical terms. Subsequent advances of no less significance, however, have increasingly limited the description of atomic processes in the language of common experience, and this, together with a formidable barrier of specialist mathematics, has tended to isolate many chemists from the newer ideas.

It is hoped in this lecture to explain simply the general import of the later developments, and then to illustrate how such knowledge helps us to understand certain chemical behavior of rubber and related substances.

Proceeding from the Rutherford-Bohr picture of the atom as a positive nucleus surrounded by negative electrons, this theory assigns the electrons to successive shells, each of a definite capacity, which in general has to be satisfied before the next shell is started. Completion of each shell results in extreme chemical inertness as evidenced by the inert gases, and the tendency of atoms with incomplete shells to attain this state determines their chemical reactivity. The outer or valency electrons, as they are called, are therefore associated with this reactivity, and are naturally understood when relating chemical properties to electronic configuration.

The electron capacity of the outer layer when being built up is eight (excluding hydrogen and helium where it is two), and atoms tend either to lose electrons and assume the grouping of the inert gas preceding them as the Periodic Table or to gain electrons and simulate the succeeding one. Such changes can proceed by direct electron transfer (electrovalency) or by suitable sharing of electrons between atoms (covalency), as pictured thus:

Electrovalency

$$\dot{\mathrm{Na}} + \cdot\ddot{\mathrm{Cl}}: \rightarrow \overset{+}{\mathrm{Na}} + :\ddot{\mathrm{Cl}}:^{-}$$

[as Ne] [as A]

Covalency

$$:\ddot{\mathrm{Cl}}\cdot + \cdot\ddot{\mathrm{Cl}}: \rightarrow :\ddot{\mathrm{Cl}}:\ddot{\mathrm{Cl}}:$$

Electrovalency therefore connotes the formation of two charged ions whose association is controlled by electrostatic forces, whereas covalency is concerned with normally non-dissociating atomic linkages. Although these types should really be regarded as the extremes of a continuous scale rather than as rigidly distinct, electrovalency need concern us no further since the compounds we are now interested in are typically covalent.

Electron sharing to provide the atoms with completed octets (duplet in the case of hydrogen) can occur by each atom contributing equally (as in the chlorine molecule) or both electrons may be donated by one atom (as in the formation of amine oxides,

$$(\mathrm{R_3N}: + \ddot{\mathrm{O}}: \rightarrow \mathrm{R_3N}:\ddot{\mathrm{O}}:).$$

Four or six electrons may also be shared as in ethylene,

$$\mathrm{H}:\ddot{\mathrm{C}}::\ddot{\mathrm{C}}:\mathrm{H},$$

or acetylene,

$$\mathrm{H}:\mathrm{C}:::\mathrm{C}:\mathrm{H},$$

but octets completed in this way obviously confer much less stability since unsaturated molecules of this type readily undergo addition reactions to form molecules with single pair electron bonds. The energy required to separate the atoms can be determined thermochemically or, less directly, spectroscopically. Values found for various bonds are given in Table I.

TABLE I—BOND ENERGIES

(in kcals./mole)

C — C	81	O — O	118
C = C	145	O — H	110
C — O	87	H — H	103
C = O	174	H — Cl	102
C — H	99	Cl — Cl	57

Note: This paper is one of a series based on lectures delivered during 1945-46 by members of the staff of the British Rubber Producers' Research Association at Newton Heath Technical School, Manchester, or before the Leicester Section of the Institution of the Rubber Industry, or under the auspices of the Extra Mural Department of the University of Birmingham.

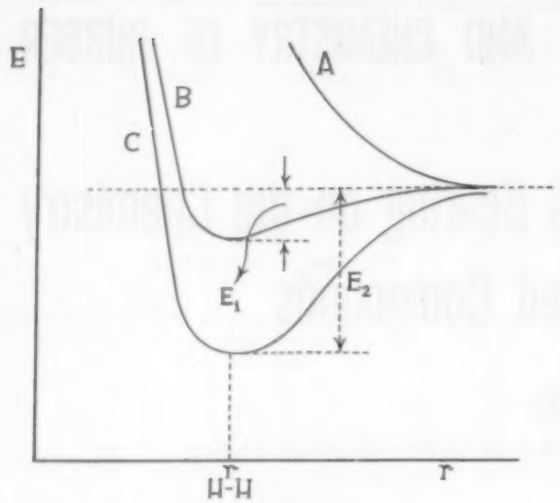


Figure 1

The general applicability of this theory soon established it as the foundation for the electronic description of atomic interaction. But it is a theory, after all: it merely seeks to express coherently the inferences of observations, and despite its wide correlations it is not without its obscurities. Apart from the existence of anomalous compounds, such as the odd-electron molecules, NO, NO_2, ClO_2, electron-deficient molecules, e.g., B_2H_6, and those requiring an atom valency shell with more than eight electrons, e. g., SF_6, the following more fundamental questions remain to be answered:

(1) What is the source of the high energy content of the covalent bond, and why is such bonding achieved nearly always, but not exclusively by electron pairing?

(2) What is the origin of directive valency? Why, for example, are the four valencies of carbon directed towards the corners of a tetrahedron, whereas those of nickel in the $[Ni(CN)_4]^=$ ion lie at right angles in one plane?

(3) Why are conjugated unsaturated compounds so markedly distinct from non-conjugated, as is particularly emphasized in the properties of aromatic compounds?

To sum up we may say that this theory sets out empirically the general rules of chemical combination but provides no clue to the mechanism of the binding process.

Quantum Theory of Valency

Attempts to derive explicit mathematical expressions for the behavior of electrons in the nuclear field, made particularly by Heisenberg, Schrödinger, and Dirac in the middle 1920's, initiated profound philosophical developments which drastically revised the earlier concepts of atomic entities. In short, the properties of the electron were recognized as inseparably and inevitably bound to the experimental conditions of investigation, that a fundamental limit governs the precision with which these properties can be defined (Uncertainty Principle), and that the description of electronic events is only possible statistically.

It is meaningless to discuss what an electron is and where it is: we can only say that in some experiments it behaves as a particle (e. g., photoelectricity), whereas in others it behaves as a localized set of waves (e. g., diffraction through molecules), and then express the probability of these properties manifesting themselves at a certain place at a certain time. A system of mathematics based on these principles (Quantum or Wave mechanics) makes it possible to formulate the properties of an atomic system by differential equations, which are however so complex that only for the very simplest atoms and molecules can even approximate solutions be derived.

The possibilities of the quantitative approach under amenable conditions may be illustrated by reference to the classical work of Heitler and London (see Fig. 1). These authors set out to solve the energetics of the system H. + H. → H : H and found that if, as the hydrogen atoms approach one another, each single electron possesses in the same manner the property known as spin, the energy of the system increases, and there is thus repulsion between the atoms (curve A); whereas if the electrons possess opposite spin an energy decrease occurs to a certain atomic separation (curve B).

The calculated energy gain on compound formation E_1, however, was only a minor fraction of that observed until the calculation was repeated taking account of a general theorem of quantum mechanics known under the name "resonance." In addition to considering the interaction of hydrogen atoms, H_A and H_B, having electrons 1 and 2, respectively, of opposite spin, the system $H^2{}_A$ and $H^1{}_B$ must be considered at the same time. Neither the protons nor the electrons can be separately identified, of course, but the spin condition permits alternative electronic dispositions whose energy equations must be solved simultaneously. The result is expressed in curve C, where E_2 is now about 80% of the observed bond strength, and the minimum of the curve corresponds to an internuclear distance of 0.75 Å compared with the observed 0.74 Å.

Covalent bonding is thus shown quantitatively to arise from the pairing of electrons of opposite spin, the bond energy accruing largely from the energy inherent in the phenomenon of resonance electron exchange.

Resonance Among Two or More Valence Bond Structures

The constitution of benzene presented a puzzling structural problem for several decades following the de-

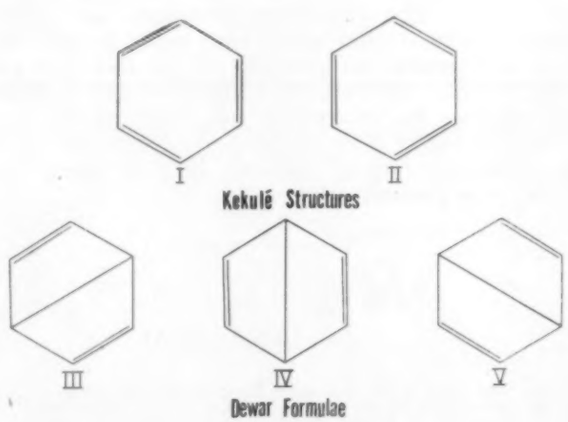


Figure 2

termination of its empirical formula and of its atomic arrangement. The paradox is that so highly an unsaturated molecule as implied by the Kekulé structures I and II (Fig. 2) should be almost entirely devoid of olefinic character—showing extreme resistance to additive and oxidizing reagents.

It is now recognized that benzene exemplifies a form of molecular resonance which may be generally described as follows: If for a fixed nuclear skeleton, a molecule can be written on Lewis-Langmuir principles in more than one electronic arrangement giving structures of comparable energies, then the real state of the molecule corresponds to none of the written structures but is hybrid incorporating features of all these in more or less degree—the more nearly energetically equivalent the possible structures, the more extensive the hybridization. The molecule is then said to resonate among its canonical forms; but it must be strongly emphasized that this does not mean rapid interconversion of the molecule from one form to another (as in Tautomerism)—the real state of the molecule is somewhere intermediate all the time. Now just as resonance electron exchange contributes so largely to the energy content and stability of the covalent bond, this resonance confers added stability on the molecule over and above that possessed by any of its canonical structures.

In the case of benzene, the Kekulé structures I and II are perfectly equivalent, so that resonance hybridization occurs to the full. Semi-empirical calculations indicate an added stability on this account of roughly 32 Kcals./mole. Instead of benzene having the energy content of the Kekulé molecules I and II, E_K, it has the value E^1 where $E^1 - E_K = 32$ Kcals. The three Dewar formulae III, IV and V (Fig. 2) are further electronic arrangements which must be taken into account, but because of their much lower energy content their contribution to the real state will be relatively small, amounting actually to about 6-7 Kcals. (i. e., $E'' - E^1$). (See Fig. 3). The benzene molecule is thus a regular hexagon with perfectly equivalent C — C bonds intermediate in character between single and double bonds—as direct physical measurements fully confirm.

Resonance energies are determined experimentally by measuring the heat changes in a reaction leading to non-resonating molecules (or molecules of known resonance energy); the heat content of a molecule with similar but non-resonating bonds being known, the required resonance energy is obtained as a difference term. Heats of combustion or of hydrogenation have chiefly been used to provide this data, which also aid calculation of the resonance energies of unstable or transient molecules where direct measurement is impossible. It is owing to the intrusion of these substantial energy terms—which can easily dictate the reaction course—that it is so important to consider resonance effects when formulating reaction mechanisms.

TABLE II—RESONANCE ENERGIES
(in kcals./mole)

1:3 Butadiene	5
Acetic Acid	25
Ethyl Acetate	25
Carbon Dioxide	33
Benzene	41
Styrene	51
Naphthalene	77

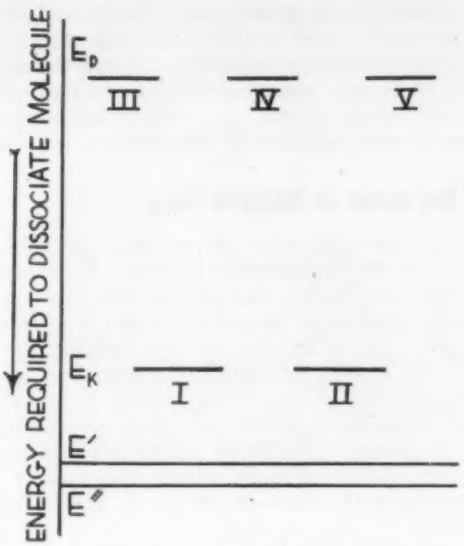
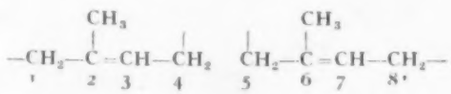


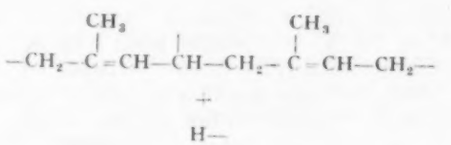
Figure 3

Resonance Possibilities in the Rubber Molecule

If the polyisoprene strain is severed at the isoprene link (as in VI, below) or if a hydrogen atom is removed from the α-methylenic groups (as in VII, below, or from atoms 1, 5 or 8), the resultant chain fragment

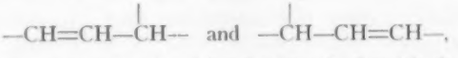


VI



VII

are substituted allyl radicals. These clearly afford a further example of a molecular resonating system since we can write two structures,



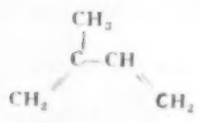
which are energetically identical and should therefore confer considerable stability on the real structure. This is in fact the case, the stabilizing energy amounting to no less than 19 Kcals. As this energy is generated as the particular bond is broken, it will participate in the breaking process and will reduce the required external energy supply for C_4-C_5 bond scission from 81 to $(81 - 2 \times 19) = 43$ Kcals., and for α-methylenic, hydrogen atom separation from 99 to $(99 - 19) = 80$ Kcals. This marked preference for bond rupture in either of these ways created by such

energy reductions is perhaps the dominant feature of rubber chemistry, and in illustration we may consider the thermal degradation of rubber, where the influence of allylic resonance energy has been revealed quantitatively, and some aspects of α-methylenic reactivity, particularly with reference to oxidation.

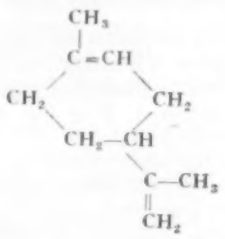
Thermal Degradation of Rubber in Vacuo

Although the molecular degradation of rubber has such wide technological repercussions, little is known of the causative factors except that they are such frequent and unavoidable accompaniments to chemical reaction generally. The simplest degradation system is probably the heating of rubber hydrocarbon in vacuo, and although its characteristics show it to be of no practical importance under the usual processing conditions it provides valuable quantitative information concerning bond breakage along the rubber chain. The experimental facts—due to Dr. J. L. Bolland—are as follows.

When rubber freed from non-hydrocarbon constituents and evacuated to 10^{-5} mm. of mercury is heated to <200° C. practically no change occurs, but at higher temperatures the rubber softens, then melts to a resinous liquid, and finally sets to a soft, non-sticky, insoluble gum. Volatile products consisting almost entirely of isoprene (VIII) and dipentene (IX) are liberated; between 220-270° there is no appreciable loss in unsaturation. The most striking



VIII



IX

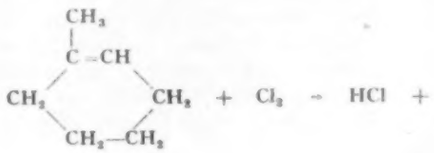
feature is the low energies of formation of isoprene and dipentene (*ca.*, 45-50 Kcals.) compared with the strength of the C — C single bond (81 Kcals.) If degradation proceeded by random scission of ordinary C — C bonds, not only would a multitude of low molecular products be expected but the rate of degradation would be inappreciable below about 400°. The arguments presented in the previous section, however, specify the isoprene link as being far from an ordinary C — C single bond in its facility for dissociation, and their substantial correctness is verified by the excellent agreement between the calculated dissociation energy allowing for resonance and the experimentally determined values for isoprene and dipentene production.

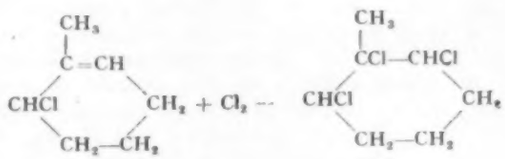
α-Methylenic Reactivity

(a) Halogenation: Only within recent years has it been fully appreciated that the reactive center of olefins is not necessarily located at the double bond which under some conditions appears surprisingly inert, a familiar example perhaps being the difficulty of accurately estimating the unsaturation of rubber by halogen addition.

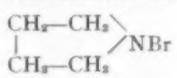
A comprehensive investigation of the course of halogenation in rubber and related olefins (Bloomfield, *J.C.S.*, 1943, 289; 1944, 114) shows that the reactions are generally complex and that simple additive compounds are the exception rather than the rule, often only resulting from the use of special reagents such as $PhICl_2$. Chlorine itself appears to act largely substitutively in the first place, addition proceeding later to give polychloro compounds.

In the case of rubber, it is not possible to specify the reaction route definitely since cyclization occurs which renders unsaturation values ambiguous, but it is quite certain that substitution occurs initially to a considerable extent. In the case of simpler olefins, Cl_2 absorbed—HCl liberated—unsaturation value relationships and isolation and identification of the reaction products indicate that attack at the α-methylenic group is the main primary reaction. Methyl *cyclo*-hexene, for example, gives almost entirely 6 (or 3)-chloro-1-methyl Δ^1-*cyclo*-hexene and 1:2:6 (or 3)-trichloro-*cyclo*-hexane:

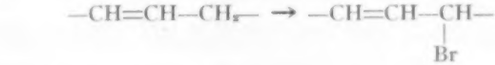




On the other hand, bromine at temperatures between 0 and —40° C. in chloroform containing a trace of alcohol reacts purely additively with rubber, whereas bromination with *N*-homosuccinimide,

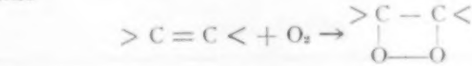


yields exclusively α-methylenic substituted products:

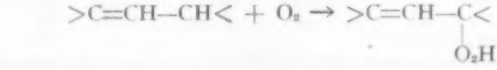


Full correlation between reaction mode and reagent type is lacking and the various reaction mechanisms remain obscure, but the general significance of the substitution of C—H bonds adjacent to the double bond cannot fail to be appreciated.

(b) Oxidation: The formerly and widely held Engler-Bach hypothesis that the oxidation of non-conjugated olefins proceeds via oxygen addition at the double bond with the formation of a cyclic peroxide



and later essentially similar modifications are now discredited since analytical and isolation procedures identify the primary product as an unsaturated hydroperoxide formed by replacement of an α-methylenic hydrogen atom:



Simple olefins such as *cyclo*-hexene give practically a quantitative yield of hydroperoxide during the early stages (2-3%) of oxidation under mild conditions, whereas with rubber the yield based on the oxygen absorbed falls progressively below 100% almost from the start of the reaction with the production of secondary products. This, and the fact that physical conditions effectively prevent concentration and detailed examination of the peroxidic material, has led to most of the considerable body of experimental work bearing on the detailed mechanism of oxidation being planned to unravel the more amenable systems before tackling the more intractable.

Process Is Separable Into Steps

Dr. Bolland will discuss oxidation mechanisms in detail in the following lecture. We need only report baldly here that the oxidation process is separable into several steps of which the vital one governing the case of reaction and the nature of the product is the interaction of peroxide radicals with the parent hydrocarbon:

$$\mathrm{RO_2^{|}} + \mathrm{RH} \rightarrow \mathrm{RO_2H} + \mathrm{R^{|}}$$

It is obvious that the weaker the C—H bond, the more easily will the hydrogen atom be displaced. Now we have described above how allyl resonance energy reduces the effective dissociation energy of α-methylenic C—H bonds by as much as 19 kcals., and hence the much more rapid oxidizability of olefins compared with saturated hydrocarbons and the reason for α-methylenic attack are readily evident. Furthermore, in 1:4 dienes, where the R radical is considerably more stabilized than the allyl radical—contributions from three energetically similar structures

$$\mathrm{—CH{=}CH—\overset{|}{C}H—CH{=}CH—},$$

$$\mathrm{—\overset{|}{C}H—CH{=}CH—CH{=}CH—},$$

$$\mathrm{—\dot{C}H{=}CH—CH{=}CH—\overset{|}{C}H—},$$

accounting for a resonance energy of 30 kcals.—the C—H bonds of the central CH_2 group are correspondingly more labile, and, as is well known, such dienes do undergo extremely facile oxidation, e.g., the constituent esters of linseed oil whose importance in the paint trade as a drying oil depends on the rapid oxidation and polymerization of these esters under atmospheric conditions.

Summary

A quantitative survey of the energy exchanges in alternative reaction paths and the relative preferences deduced throw much light in the oxidation differences of different types of olefin, as for example between a mono-olefin and a conjugated di-olefin (Bolland and Gee, *Trans.Far.Soc.*, in press). Discussion of these wider aspects is beyond the scope of this lecture, but it is hoped that sufficient ground has been covered to demonstrate that ignorance of resonance effects would drastically curtail our understanding of the oxidation of hydrocarbons in general.

Hamilton Standard's New Electrical De-Icing System

A NEW electrical propeller de-icing system, which is used internally with a hollow steel blade and externally with duralumin blades, has been developed by the Hamilton Standard Propellers Division of United Aircraft Corp., East Hartford 8, Conn. The hollow steel blade is de-iced by current applied to special alloy heater wires cemented to the inside surface of the blade's leading edge. This is said to be the first known application of this type in propeller de-icing history.

For duralumin blades the heating element consists of three layers of different rubber types mounted externally on the leading edge. The middle layer of conductive rubber by its electrical resistance supplies the heat; the inner layer is selected for good cementing and thermal insulation characteristics and the outer layer is selected for smooth finish and high erosion resistance. Total thickness of the pad is approximately one tenth of an inch.

In both blade installations, the heated section covers approximately 75 per cent of the blade length and 20 per cent of the width extending from the leading edge. Electric current for de-icing is derived from the airplane battery and generator and carried to the propeller by a slip ring and brush system. Wires conduct the current to the heating elements on the blades.

The power supply is controlled by a timing device mounted in the airplane which "cycles" current to each propeller in turn, this minimizing the load on the airplane's electrical system. In this way, heat can be applied to each propeller for a 20-second interval and shut off for 60 seconds under icing conditions at moderate air temperatures.

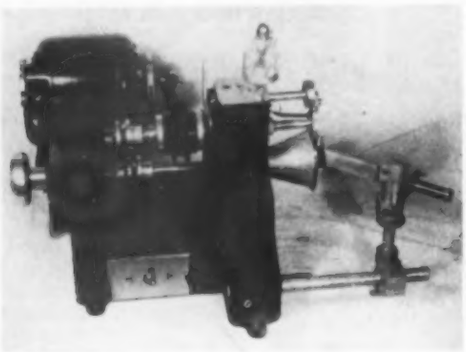
To cope with icing at very low temperatures, a double-throw switch in the cockpit permits the pilot to select a second cycle of 60 seconds operation and 180 seconds "off." The timer can also be internally adjusted to meet varying time requirements for conditions prevailing on the routes of a particular airline.

Hundreds of hours of testing have proved the Hamilton Standard de-icing system's practicality, and the development program is continuing throughout this winter with a twin-engine airplane especially equipped to spray water on one propeller in below-freezing temperatures.

The new electrical system is not expected completely to supplant the division's previous method of fluid de-icing, employing alcohol delivered to the propeller under pressure and discharged along the blade by a slinger ring and tubes. A place will also probably still exist for the chemical de-icing lacquer, Ice-Lac, which is painted on blades.

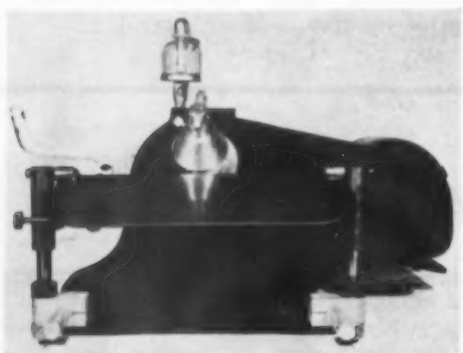
Type H. E. Wills Trimmers

Development of a new line of trimming machines, designed to trim outside overflow in the manufacture of rubber and plastic heels and soles, mechanical goods, gaskets, packing rings, washers, rubber impregnated



Wills Model H. E. 100–6

textiles, etc., has been announced by the Wills Rubber Trimming Machine Co., P. O. Box 242, Canton 1, Ohio. Called the Type H. E. Wills Trimmers, the machines are said to be smooth and quiet in operation and to afford protection against cutting into the material and safety for the operator. Special features of the new trimmers are the knife designs. The lower knife is



Wills Model H. E. 100–8

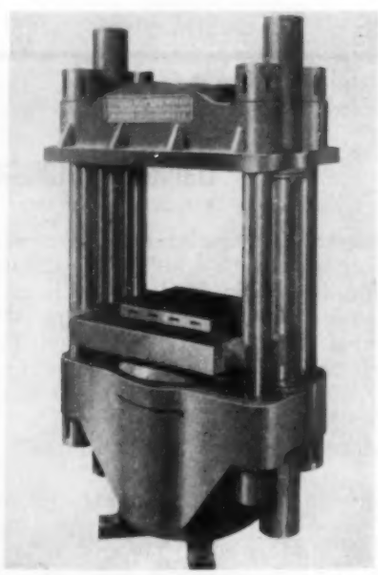
mounted on a hollow hub permitting an accurate setting of the spinning attachment so that smaller diameters can be trimmed without interference. The upper knife is of special design, facilitating sole trimming and other turning operations when used in conjunction with flat feed tables.

Fork-Type Power Industrial Truck

The development of a new fork-type power industrial truck with an elevating reach of 18 feet above floor level has been announced by the Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio. The company's standard models heretofore have had a lifting range up to 10 or 12 feet, with a few special models going as high as 16 feet. Identified as Model F-24-T, the new truck picks up loads on its bare fork or on pallets in the same manner as with standard models. Its capacity is rated at 4000 pounds for lifting to a height of 11 feet, and 3000 pounds to 18 feet. It is electrically driven, with three separate motors—one for traveling, one for operating the elevating mechanism, and the third for tilting the upright columns. Tilting limit is 15° backward and 5° forward from vertical. Lifting speed with capacity load is 13 feet per minute, lowering speed 20 feet per minute; truck's traveling speed 5 miles an hour. The body of the truck, independent of the uprights and fork, is 7 feet, 8 inches long. Over-all width is 3 feet, 2 inches, enabling it to maneuver in narrow aisles. It is end-controlled, and the top of the body at the control panel is 4 feet 2 inches above the floor level.

Pomona HP-300 Hydraulic Press

Designed for all types of compression mold, the Pomona HP-300 Hydraulic Press has been introduced by the Pomona Machine Works, Pomona, Calif. The new press has a capacity of 300 tons with a stroke of 16 inches. There is daylight of 24 inches and the strain rods are 4 inches in diameter while the ram is 16 inches in diameter. The HP-300 has a booster ram for quick closure to the operating point, enabling the use of a small capacity pump because the main cylinder is suction pre-filled to the point where high pressure must be applied. This system is said to eliminate the expensive two-stage pumping unit with its high and low pressure pumps and complicated piping and valve



system, substituting a single pump and simple valve to minimize time required for closure.

The new press is also fitted with push-back cylinders. Both the booster and push-back cylinder have 3 inches in diameter rams, contained in 3½-inch cylinders. It can be operated in conjunction with any of the new types of control systems which provide adjustable stroke and semi-automatic operation. Of heavy cast steel construction, the press weighs approximately two tons, is 6½ feet high, and has 24 x 24-inch platens.

Use of Peat in Synthetic Rubber Compounds

By C. W. DAVIS

Assistant Research Chemist, National Research Council, Ottawa, Canada

ALTHOUGH handled on the same equipment as natural rubber, the compounding of synthetic rubber presents many new problems. Few, if any, of the synthetics mill as satisfactory as rubber itself, and special techniques have been devised for the various types of synthetics. Faced with the problem of producing synthetic rubber for general use, the manufacturers will undoubtedly continue to improve the present synthetics, while compounding techniques will keep step with such improvements.

It is still too early to evaluate the synthetic resilient products both as to competitive costs and properties, although synthetic rubbers were of fundamental importance during the late war and their uses will be broadened in the face of increasing supplies of natural rubber.

Tackiness in synthetic rubber has always been a prime problem. The summary of an investigation of tackiness in GR-S compounds made available in June, 1945, contained the following comment: "It was observed generally that the tackiness is increased by heating and milling in sheets as thin as possible. The addition before heating of oxidizing agents, such as peat residue and five inorganic substances, gave greater tackiness than the control. This tackiness, however, is apparently lost by milling carbon black, or similar reducing agents, into the rubber."

It is therefore apparent that the use of oxidizing agents is not recommended for use in the manufacture of products that must have high elongation, tensile, etc., and good aging properties. Of the six oxidizing agents used in the investigation mentioned above, the peat substance was the cheapest, estimated cost being approximately 2c a pound compared with a cost of over 25c a pound for each of the other agents used.

At the time, the author was doing research work on new uses for peat and one problem faced was the manufacture of a satisfactory building board from peat by mixing resins and other fillers and plasticizers with peat moss fibre.

TABLE I—PULVERIZED PEAT-GR-S COMPOUNDS

	Black (*in grams*)	Colored (*in grams*)
GR-S	35.	45.
Pulverized Peat	50.	50.
Zinc Oxide	10.	10.
Whiting	..	40.
Asbestos Tailings	90.	100.
Fibrous Peat Moss	50.	50.
Wyex	15.	..
Color (Green or Red)	..	3.
	250.	298.
Sulfur	1.0	1.2
Captax	0.7	0.8

Since GR-S was as low in cost as any of the resins a series of experiments were conducted with it and it was soon found that it could be used in lower percentages to give products with better physical properties. Preliminary mixes with 5, 10, 15, 20 and 25% GR-S indicated that the physical properties in compounds did not improve much with loads of more than 10%, although loadings of 15% resulted in a product which milled and calendered more readily.

Of the various formulas tested, those shown in Table I, which were mixed in a small Banbury laboratory mixer, gave the best results. These compounds required only 7 to 9 minutes for mixing in the Banbury and sheeting out on a small mill. Pressed and cured into black tile with 12 to 15 minute cures, they gave products comparable to commercial flooring materials which cost twice and three times as much.

Inorganic colors, such as ochres and siennas, gave some trouble in molding and curing, but with proper control a dark tan to brown product was obtained that had properties equivalent to the black tile. Brighter colors could probably be obtained by the use of titanium pigments with the organic color pigments.

Laboratory tests for abrasion, impact, aging, etc., are not as conclusive as actual wear tests under a variety of conditions, and therefore the commercial importance of the new product has yet to be proved even in the face of the high cost of commercially available flooring materials.

At the time these experiments were undertaken, a number of rubber companies were experiencing difficulty in their attempts to produce a good molded sponge rubber product from GR-S compounds. Most attempts had been made with the so-called Vanderbilt formula using sodium bicarbonate as the blowing agent.

Ammonium humate decomposes at a temperature above 80° C. Several test products using ammoniated peat as the blowing agent were made and showed good properties. Although the value of ammonia compounds as potential blowing agents has been recognized in the literature, the difficulties in adding such compounds as ammonium carbonate to rubber mixtures discouraged their use.

When the war in Europe came to an end much information regarding German research was made available. It was learned that the Germans had been using a synthetic compound called Parafor N, made by the reaction of hydrazine with acetone. This synthetic crystalline compound was reported to be an excellent blowing agent. Soft mixes had little strength, but when used in mixtures with a good percentage of added filler better products were obtained.

In conclusion, it is pointed out that finely ground peat is comparable in price and is quite as readily milled into GR-S compounds as are many of the fillers currently in use. More laboratory research on this material on the part of rubber manufacturers would probably produce excellent results.

Editorials . . . . . .

Presidential Message

JUST AS THIS issue was going to press, President Truman delivered his long-awaited recommendations to Congress on the over-all rubber situation. Pointing out that production planning for synthetic rubber is contingent upon new legislation, the President urged Congress in a special message delivered on February 7 to take prompt action "that will provide the basis for continuity of operation in rubber controls." Previously, as reported elsewhere in this issue, the Chief Executive had requested Congress to extend the Second War Powers Act in which is incorporated the authority to enforce Rubber Order R-1.

In his special message to Congress on the rubber situation, President Truman recommended three specific legislative steps, as follows:

(1) A joint resolution by the Congress declaring government policy to be "to maintain a synthetic rubber industry in the United States adequate to the minimum needs of national security."

(2) Establishment of committees by both the Senate and the House to consider the problems involved in maintaining a synthetic rubber industry, and drafting of legislation to that end.

(3) Authority for the Administration to continue its rubber allocation controls for another year, so that Congress may have sufficient time to enact permanent legislation for a national rubber policy.

In his message, President Truman emphasized the fact that by late 1947 "and almost certainly by early 1948," natural rubber production will have increased to the point where it will be possible to satisfy world rubber needs largely from natural rubber. With an adequate world supply of natural rubber, he continued, the domestic use of synthetic rubber might fall substantially below the permanent production goals deemed minimum for national security purposes. This "minimum," it will be recalled, was set at 250,000 tons by the Inter-Agency Rubber Policy Committee. However, there has been some talk in official circles in recent weeks which indicates that a figure of 200,000 tons, or slightly less, will also be satisfactory.

On the subject of national security the President emphasized still another point. Calling attention to the fact that the Strategic Materials Stockpiling Act of 1946 covers the accumulation of natural rubber, Mr. Truman pointed out that the physical properties of rubber and the necessity of stockpile rotation tend to make the stockpile of rubber inadequate of itself to meet a national emergency. This was another excellent reason, he stated, why the stockpile must be supplemented by an assured production of American-made rubber. (The stockpile figure of natural rubber is generally assumed to be somewhere in the neighborhood of 160,000 long tons).

It is clear from the President's message, and his recommendations, that the eventual answer to the current problem presented by rubber, including maintenance of the synthetic rubber industry, lies in Congressional legislation. A start on such legislation was recently made in the House in the form of a bill proposed by Representative Arends of Illinois. A resolution requesting the President to issue instructions pending trade agreement negotiations to the effect that no commitment shall be made which will interfere with the imposition of an import duty on natural rubber, offered by Representative Curtis, has also been introduced. The Arends bill is now under consideration by Sub-Committee 3 of the House Committee on Armed Services, while the Curtis resolution has been referred to the House Committee on Ways and Means.

Neither the Arends proposal or the Curtis resolution cover all the problems of the rubber field. The most sensible action at this time would seem to be two-fold: (1) Extend that portion of the Second War Powers Act covering rubber regulation so that allocation and specification controls can be continued until such time as Congress enacts legislation embracing a national rubber policy, and (2) Restore free trading in rubber on or about July 1, or sooner, so that the United States will be certain to secure its full and fair share of natural rubber this year.

CURRENT NEWS OF THE MONTH

INITIAL RUBBER LEGISLATION IS INTRODUCED IN CONGRESS

Legislation to continue exclusive public purchase of rubber until a permanent national rubber policy is established was introduced in the House of Representatives on January 21 by Republican Majority Whip Leslie Arends of Illinois. The proposal, which marked the first rubber legislation introduced into the new Congress, and which was referred to the House Armed Services Committee for consideration, goes considerably further toward prolonging controls than the Truman Administration has indicated it seems necessary. If approved, the measure would accomplish the following:

(1) Authorize the Government to act as the sole purchaser and seller of natural rubber until permanent rubber legislation is established, but not beyond March 31, 1948.

(2) Authorize continued controls over rubber usage until permanent legislation is enacted.

(3) Broaden the Strategic Materials Stockpiling Act to permit greater Government holding of natural rubber, and authorize frequent rotation of stocks to ensure that fresh rubber is always on hand in adequate supply.

(4) Authorize a Congressional investigation with a view to enacting a strong synthetic rubber industry and the maintenance of an adequate natural rubber stockpile.

Resolution Also Introduced

Shortly after the introduction of the Arends bill, Representative Carl Curtis (Rep., Neb.) on January 23 introduced a resolution in the House requesting the following: (1) That the State Department make no commitments which might interfere later with placing an import duty on natural rubber; (2) That the President recommend a permanent policy for maintaining the synthetic rubber industry; (3) That the Tariff Commission report to Congress on production costs of synthetic rubber and costs of imported natural rubber; and (4) That the Tariff Commission make a study to determine what rate of duty would be necessary to keep synthetic production at 250,000 tons and/or 600,000 tons.

In this connection it should be pointed out that as of this writing (February 5) President Truman has not yet submitted specific recommendations on the rubber situation to Congress, although as reported last month it was indicated by John R. Steelman, Assistant to the President, that such recommendations will be forthcoming shortly.

Suspend Wage Talks

Wage negotiations between the United Rubber Workers of America (CIO) and representatives of U. S. Rubber, Goodyear, Goodrich and Firestone, which started in Cincinnati on January 27, were suspended on February 4 for at least 90 days. According to union officials, the rubber companies insisted on the suspension period. The negotiations were being held on the union demand for an increase of 26c an hour, presented to the company managements last November.

However, on February 3, the President asked Congress to extend for another year some of his war powers "in the interest of the effective completion of reconversion." The request, in the form of a written message, pointed out that control of allocations for some imported industrial materials, including rubber, must be preserved because supplies will not equal demand for some time.

In a statement made on January 23, Chairman Robert A. Taft of the Senate Republican Policy Committee indicated that he personally favors extension of Government controls over rubber and sugar. He subsequently emphasized this feeling in a radio address. Although no rubber legislation has been placed before the Senate as yet, on January 22 a standing rubber sub-committee of the Senate Banking and Currency Committee was named to handle all legislation coming under its jurisdiction. This subcommittee is composed of Senators Bricker (Rep., Ohio), Cain (Rep., Wash.), and Robertson (Dem., Va.).

Industry Battle Continues

In the interim the battle between some of the rubber manufacturers and rubber traders over the restoration of free rubber trading continues. Taking issue with a number of public statements made recently by executives of tire companies, particularly P. W. Litchfield of Goodyear, urging continued government buying and importation of natural rubber, the Rubber Trade Association of New York, Inc., on January 30, again emphasized that the price of any commodity is governed by supply and demand and if the government will continue its powers of end-use control beyond March 31st, such control will be sufficient to keep demand in balance with supply.

RFC INCREASES RUBBER PRICE TO 25-3/4 CENTS PER POUND

In accordance with its first-in first-out inventory accounting procedure, and to take care of the increased cost of 150,000 long tons of rubber procured during the third quarter of 1946, the Office of Rubber Reserve, Reconstruction Finance Corporation, has increased the selling price of natural rubber to 25¾c per pound (plus the applicable uniform freight charge), with appropriate differentials for other than base grades. The new price was effective with deliveries made on and after January 13, 1947.

In announcing the price increase, a jump of 3¼c from the previous 22½c per pound figure, Rubber Reserve pointed out that the previous figure was maintained until the first of the year as a result of a directive dated September 5, 1946, from the Office of War Mobilization and Reconversion. This directive was based upon the first-in first-out inventory accounting procedure, in accordance with which it was estimated that the low priced rubber then in RFC inventory, together with anticipated arrivals under Congressionally approved subsidy arrangements, would be adequate to cover all sales to domestic consumers through the end of the year. The exhaustion of this lower price inventory led to the price increase.

The price increase is expected to cost the rubber manufacturing industry approximately $10,000,000. Some hope was held out that the price of some of the synthetic rubbers may be reduced shortly to offset the higher natural rubber cost.

Industry Raises Objections

Announcement of the price increase brought an immediate storm of protest from the rubber manufacturing field. Calling the announcement "untimely and unfortunate," Herbert E. Smith, president of the U. S. Rubber Co., stated that while technically the RFC may be correct in its use of the first-in and first-out accounting method, "the increase comes at a time when the rubber industry is trying to maintain the stable price conditions which have existed for several years."

Charging that the decision "plays into the hands of international speculators," P. W. Litchfield, board chairman of the Goodyear Tire & Rubber Co., said that the abrupt action could have been avoided by averaging up the price of the Government's total supply of natural rubber on hand and contracted for (390,000 tons), of which 240,000 tons stand at the old delivered price of 22½c a pound. This would have meant an increase of only 1¼c a pound at this time.

MEETING OF RUBBER DIVISION NOW DEFINITE FOR CLEVELAND

Official confirmation to the effect that the Spring Meeting of the Division of Rubber Chemistry of the American Chemical Society will be held on Monday, Tuesday, and Wednesday, May 26, 27, and 28 in Cleveland, Ohio, has been made. This will not be a joint meeting with the American Chemical Society, as the parent society will meet in Atlantic City, N. J., from April 14 through April 18. The exact number of sessions to be held at the Division's meeting will be determined by the number of papers submitted.

Divisional headquarters will be at the Hotel Cleveland, Public Square and Superior Avenue, where the technical sessions will likewise be held, and those planning to attend are urged to make immediate reservations.

Local arrangements for the Cleveland meeting have been placed in the hands of a committee headed by Allyn I. Brandt, general sales manager of the B. F. Goodrich Chemical Co., with C. A. Smith, of the New Jersey Zinc Sales Co., as vice-chairman in charge of housing arrangements. The Divisional banquet will be held on Tuesday evening, May 27, at the Hotel Cleveland.

As usual papers are invited dealing with some phase of the science and technology of natural or synthetic rubber for presentation at the technical sessions. Abstracts of 200 to 250 words, giving the laboratory in which the work was done, the author's business connection, and the time required for proper presentation, should be submitted in triplicate to the secretary of the Division, C. R. Haynes, Binney & Smith Co., 41 East 42nd St., New York 17, N. Y., by March 31.

Particularly welcome for the Cleveland meeting will be papers covering descriptions of researches on the practical or commercial features of the industry. Improvements in the arts of compounding, processing, meeting of intricate specifications, adaptation of foreign techniques and materials, and use of combinations of synthetic rubbers or synthetic rubber and natural rubber to obtain unique characteristics, are among the subjects the Division would like to open for discussion at the meeting.

Plan Third Polymer Forum

The Third High Polymer Forum will be held during the 1947 Spring Meeting of the American Chemical Society, scheduled for Atlantic City, N. J., the week of April 14. Four or five half-day sessions are tentatively planned for the Third Forum, which will be under the sponsorship of the Division of Rubber Chemistry. The sessions will probably be held during the early part of the meeting. In addition to the Division of Rubber Chemistry, the following divisions are cooperating in the forum: Cellulose; Colloid; Organic; Paint, Varnish and Plastics; Physical and Inorganic.

Flory Receives Baekland Award

Dr. Paul J. Flory

Dr. Paul J. Flory, 36-year old head of fundamental research for the Goodyear Tire & Rubber Co., has been chosen as the 1947 recipient of the Leo Hendrik Baekland Award of the North Jersey Section of the American Chemical Society. The award, consisting of a gold medal and $1,000 in cash, is given biennially to an American chemist under 40 years of age in recognition of accomplishments in pure or industrial chemistry. Dr. Flory was cited for outstanding achievement in the field of high polymers. Born at Sterling, Ill., in 1910, Dr. Flory attended Manchester College where he received the degree of bachelor of science in 1931. He pursued graduate studies at Ohio State University, obtaining the master of science degree in 1931 and the doctor of philosophy degree in 1934. After four years at the experimental station of E. I. du Pont de Nemours & Co., at Wilmington, Del., he became a research associate at the basic science laboratory of the University of Cincinnati in 1938. He was associated with the Esso Laboratories of the Standard Oil Development Co. from 1940 until 1943, when he joined the Goodyear research staff at Akron. During World War II, he participated in the government's synthetic rubber research program.

Grant Leaves Rubber Reserve

Alan L. Grant, who has been serving as president of the Rubber Development Corporation for the past two years, has resigned from that position as of February 1 and has returned to the Charles T. Wilson Co., New York, in his capacity of vice-president. Mr. Grant has been succeeded as president of Rubber Development by Richard Baybutt, who has been acting as Deputy Director of the Office of Rubber Reserve.

U. S. RUBBER AND UNION ENTER COMPANY-WIDE PACT

The first nation-wide employer-employee contract adopted in the rubber industry in the United States was signed by the United Rubber, Cork, Linoleum & Plastic Workers of America, CIO, and the U. S. Rubber Co. in Cincinnati, Ohio, on January 27. Approximately 30,000 workers of the company in its sixteen factories from Rhode Island to California are affected. The contract, which will become effective when supplementary agreements are executed in the plants and will run until July 1, 1948, does not cover the wage question.

G. L. Patterson, general counsel for the union, and E. M. Cushing, supervisor of labor relations for the company, issued a joint statement praising the new contract as "a milestone in the field of labor-industry relations in the rubber industry." The contract included the following provisions:

1. One week vacation after one year of service and two weeks after five years.
2. Workers with ten years of service and less than fifteen will receive one week's pay for each year of service on dismissal, those with twenty years will receive one and one-half weeks' pay for each year, and employees with the company for twenty or more years will receive two weeks' severance pay for each year of service.
3. Workers concerned in contract disputes will remain on the job while a decision is reached by an impartial umpire.
4. Women doing the same work as men will receive the same pay.
5. Check-off of fees, dues, and general assessments.
6. Compensation for time spent when workers report and find no work available.
7. Detailed methods of computing pay rates.

Revise Pre-War Rubber Contract

Preliminary to eventual resumption of rubber futures trading, which was suspended February 6, 1942, the Commodity Exchange, Inc., has adopted several changes in its rubber contracts. These included the following: (1) No. 1 ribbed smoked sheets is now base grade in place of No. 1X grade, with the latter grade tenderable against contracts at a premium of 5 points; (2) The ports of Boston, Norfolk, Philadelphia and Baltimore have been added to New York as delivery points; (3) "Barebacks," or unwrapped packages of smoked sheets, are now deliverable as well as the pre-war bales and cases; (4) When rubber futures trading on the Exchange is restored, it will be conducted in the current month and the fourteen succeeding months, or fifteen deliveries in all as compared with twelve in the pre-war contract. The new contract was officially approved by the membership on January 21.

INDUSTRY URGES CONTINUATION OF PRESENT RUBBER TARIFFS

Arguments supporting continuation of present tariffs on various rubber products were recently filed with the State Department by three important divisions of the rubber manufacturing industry. The filing of briefs setting forth these appeals was announced by the Rubber Manufacturers Association.

The briefs were directed to the Committee for Reciprocity of Information for use in connection with hearings which opened in Washington on January 13 as a prelude to reciprocal trade agreement negotiations with several countries that will be conducted by the State Department in April.

Maintenance of present tariff levels, in some cases, and restoration of the higher tariff levels which existed prior to reciprocal trade agreements, in other cases, were requested by the rubber mechanical goods, the rubber footwear and the rubber drug sundries divisions of the industry, the Association said.

The briefs set forth that the value of products manufactured in these branches of the industry approached the half billion dollar mark in 1945. In the mechanical goods division alone, sales value of end products was estimated at nearly a quarter of a billion dollars, and it was noted that production requirements of this division afforded jobs for more than 70,000 American workers.

Appeals for tariff extension were based on the grounds that the industry has encountered substantial increases in both labor and component materials costs since the present tariff rates were established, and that any reduction would place the industry at a serious competitive disadvantage with historically low cost and low wage producers in foreign countries.

Labor costs here were shown to be up 81 percent in rubber mechanical goods since 1937; up 167.5 percent in rubber footwear since 1932; and up 71 percent in rubber drug sundries since 1941. Average price of rubber has risen from 14.7 cents a pound in 1938 to 22½ cents a pound today. Cost of some textiles used by manufacturers of rubber mechanical goods has risen more than 300 percent since 1937. Chemicals, packing and other components used by manufacturers of rubber drug sundries were shown to have climbed as much as 80 percent.

Arguments underlining the vital importance of rubber drug sundries and protective footwear to public health and welfare and the dependence of American industry upon thousands of different rubber mechanical goods were set forth in the briefs.

Also noted were earlier findings of the tariff commission that import duties —even in the era of low production costs in the early 1930's—were required to protect these branches of the industry from a ruinous flood of goods from factories in the low-wage centers of Japan, India, and Central Europe.

Coming Events

Feb. 20. Southern Ohio Rubber Group, 24 West 4th St., Dayton, Ohio.
Feb. 21. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.
Feb. 24-28. A.S.T.M., Spring Meeting and Committee Week, Hotel Benjamin Franklin, Philadelphia, Pa.
Mar. 10-22. American Toy Fair, Hotel McAlpin, New York City.
Mar. 14. Boston Rubber Group, Hotel Somerset, Boston, Mass.
Mar. 17-19. N.A.W.M.D. Hotel Sherman, Chicago, Ill.
Mar. 21. Chicago Rubber Group, Hotel Morrison, Chicago, Ill.
Apr. 11. New York Rubber Group, Hotel McAlpin, New York City.
Apr. 14-18. A.C.S., 111th Meeting, Atlantic City, N. J.
May 9. Akron Rubber Group, Hotel Mayflower, Akron, Ohio.
May 9. Chicago Rubber Group, Hotel Morrison, Chicago, Ill. (Tentative).
May 9. Connecticut Rubber Group.
May 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Cleveland, Cleveland, Ohio.
June 16-19. A.S.M.E., Semi-Annual Meeting, Stevens Hotel, Chicago, Ill.
June 16-20. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.
Sept. 15-19. A.C.S., 112th Meeting, New York City.

For example, it was pointed out in the footwear brief that wage scales have always been substantially higher in this country. While current figures on rates abroad are not available, it was noted that the Japanese average for all industrial workers was only 52 cents a day in 1939. In Czechoslovakia, a large producer of footwear, the average industrial wage in that year was only 64⅓ cents a day.

Testifying at the Washington hearings on January 23, E. H. White, vice-president of the U. S. Rubber Co., stated that it was not possible to predict what would happen to domestic business after foreign competition "gets rolling" but he intimated that American manufacturers of rubber footwear would probably have to request an increase in current tariffs.

J. B. Brady, also of U. S. Rubber, said that foreign rubber footwear is sufficient in quality to be interchangeable with that made in the United States "and unfortunately people usually don't ask for a particular brand of footwear." J. S. Barrie, vice-president of the Hood Rubber Co., also testified.

Seeks Agency in Holland

Eriks' Pakking & Rubber, Kantoor en Magazijn, Houttil 2 Alkmaar, Alkmaar, Holland, is interested in hearing from American manufacturers of mechanical rubber goods who are seeking sales representation in that country.

WARTIME RESEARCH PROGRESS DISCUSSED BY DR. DINSMORE

Industrial research was so stimulated after Pearl Harbor that as much was accomplished in the four war years as would have been done in a dozen or more normal peacetime years, according to a statement made recently in Akron by Dr. R. P. Dinsmore, vice-president in charge of research and development for the Goodyear Tire & Rubber Co.

Dr. Dinsmore conceded that there still were great strides to be made in industrial research and emphasized that many consumers had not yet realized the benefits of the war-born developments because of material shortages, strikes, and other obstacles which have prevented a complete mass distribution of new products.

The rapid changeover from pure research to applied research was cited as one of the most important accomplishments during the war. He pointed out that we would not have had the commercial excuse to build research facilities in peacetime as we did in wartime.

Dr. Dinsmore estimated that synthetic rubber showed as much advance in general as any other given item. During World War II he served as assistant deputy rubber director and organized the synthetic rubber research and development program for the government. Perhaps we made as great strides during the war on synthetic rubber as we would have in fifteen or twenty years under normal circumstances, he observed.

Referring to plastics, the Goodyear executive said that considerable progress was made in wartime research on plastics materials, but that it would have been even greater had it not been necessary for the government to freeze stocks of certain chemicals because of shortages. He noted that chemical shortages still remain a threat to production of some items.

Pliofilm, the rubber hydrochloride film produced by Goodyear, was described as an outstanding example of a versatile product developed and improved through constant research. Dr. Dinsmore said that Pliofilm already packaged diversified products such as tobacco, cheese, corn-on-the-cob, fresh-cooked meats, dill pickles, and numerous others. Other possibilities, he added, are its use to encase delicate moving parts, ball bearings, mechanical instruments, or even typewriters.

Among other achievements listed by Dr. Dinsmore in Goodyear's research laboratories were the following: development of Pliobond, an adhesive which is flexible, waterproof, and has a high tensile strength; considerable improvement in the quality of cotton used in the manufacture of some tire cords; development of Dektread, a non-skid deck covering used by the Navy and said to be applicable in cargo vessels or on the farm and in shops and factories to provide sure footing around machinery; and progress in the study of electronic or high frequency electrical vulcanization.

RUBBER DATA MADE AVAILABLE BY DEPARTMENT OF COMMERCE

Information on rubber, as obtained from reports of foreign service officers and from other sources, was released on January 30 by the Rubber Unit, Office of International Trade, Department of Commerce. The data by country follows herewith:

Canada: Crude natural rubber has been exempted from import restrictions but import controls remain on synthetic rubbers of the neoprene, Butyl, and GR-S types and their latices.

Belgian Congo: Lever Brothers interests are expanding rubber plantations which were founded during the war years. Two plantations covering 5,300 acres have been started at Mokaria and Gwaka in the northwestern part of the Congo near the Congo River. An additional 6,400 acres are in the process of being planted, and housing and social projects are under way to accompany the expansion.

Latin America: From January through November in 1946, 26,916,392 kilograms of rubber were shipped from Brazilian ports, as compared with 27,173,263 shipped in 1945. All of the 1946 shipments went to the United States, except for 13,290,639 kilograms of Brazilian origin shipped to southern Brazil. At the end of November, stocks held by the Banco de Credito de Borracha in Brazil were 6,614,258 kilos, which included 441,964 kilos in Rio de Janeiro and Sao Paulo, remaining after purchases of 2,500,000 kilos and shipments of 1,230,498 kilos during November, 1946.

The total rubber production of Latin American countries other than Brazil for 1946 is estimated at over 13,000 tons. Bolivia exported 3,284 tons the first eleven months; Ecuador, 1,014 tons in the same period; Panama, 59 tons in the first six months; and Costa Rica, 22 tons in the first five months, after which nothing was shipped through September. Haiti exported 3 tons in nine months; Guatemala, 2 tons in January, after which nothing was shipped through November. There were no exports from Colombia in the first nine months but local consumption was 713 tons. Mexican shipments are indicated by the United States imports of guayule, 4,850 tons in eleven months. For Peru, shipments to the United States were reported at 488 tons for seven months and local consumption at 578 tons.

Netherlands East Indies: In the first ten months of 1946, a total of 161,737 long tons of rubber were exported. Of that total, 32,491 tons were shipped to the United States, 7,759 to Holland, and 121,487 to Malaya. The rate of shipments averaged 23,000 tons monthly since mid-year of 1946. During the first half of 1946, 9,158 long tons were exported to the United States and 920 to Europe, while imports into Malaya amounted to 59,624 long tons.

WYROUGH AND MACKAY JOIN PHILBLACK TECHNICAL SALES STAFF

George Wyrough

John A. MacKay

George Wyrough, who has served as factory manager for the Whitehead Bros. Rubber Co., Trenton, N. J., for the past five years, and John A. MacKay, formerly technical superintendent of the Sun Rubber Co., Barberton, Ohio, have been appointed technical sales representatives of the Philblack Division of the Phillips Petroleum Co.

Mr. Wyrough will serve the New Jersey, southeastern New York (including New York City), eastern Pennsylvania, Maryland and Virginia areas, with headquarters in Trenton, N. J., while Mr. MacKay will serve the New England and eastern New York territory, with headquarters in Boston, Mass.

Mr. Wyrough was graduated from Pennsylvania State College with a degree in chemical engineering in 1920. Before joining the Whitehead concern as chief chemist, he was associated with the Thermoid Co., the Republic Rubber Co., and the Murray Rubber Co., serving with the latter as chief chemist. He was chairman of the New York Rubber Group in 1946 and is a member of the Heavy Mechanical Goods Technical Committee of the Rubber Manufacturers Association.

Mr. MacKay is a graduate of Acadia University, Nova Scotia, Canada, where he received a degree in science and engineering. After being associated with the McCool-Frontinac Oil Co., the S. C. Williams Rubber Co., and the Dominion Rubber Co., all in Canada, he joined the Sun Rubber Co. as assistant chief chemist, later being promoted to chief chemist, and still later technical superintendent.

California Group Has Meeting

The meeting of the Northern California Rubber Group, held on January 21 at Angelo's Restaurant in Oakland, Calif., was devoted exclusively to a business session. At the meeting, the position of treasurer was separated from the function of the present secretary-treasurer's job, and Neil McIntyre, of the Oliver Tire & Rubber Co., was appointed to handle the treasurer's duties until the Group votes on confirmation of this act at a later date. The following committee chairmen for 1947 were appointed at the meeting: *Prize,* Bill Elwell (California Research Corp.); *Publicity,* W. E. Winterbourne (Oliver Tire); *Fines,* Eugene Foubert (Plant Rubber); *Current Events,* John Kirby (L. H. Butcher); *Membership,* John Liljegren (Pioneer Rubber); *Summer Outing,* Elmer Lycett (Goodyear Rubber); *Christmas Party,* Edward Coxhead (Pioneer Rubber).

Cuban Plant in Production

Production of passenger car tires, embodying the same construction and wide tread design as the first postwar tires manufactured by the B. F. Goodrich Co. in the United States, has started at the plant of Compania Goodrich Cubana, S. A., in Havana, Cuba. The installation of curing molds for the new, wider tread design by the parent company virtually completes its intensive program of changing over molds in its American plants.

Reduce Price of Butyl Types

Office of Rubber Reserve, Reconstruction Finance Corporation, announced reductions in the price of certain types of non-standard butyl rubber on January 20. Henceforth, GR-I 40 BL, GR-I 50 BL, and GR-I 60 BL will be sold at 16½c per pound; GR-I Strained Plant Clean-Up, 13½c per pound, and GR-I Unstrained Plant Clean-Up, 10c per pound.

CONTINUATION OF CONTROLS RECOMMENDED BY LITCHFIELD

In the sixth of a series of notes to the American rubber industry, issued recently in Akron, P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., strongly recommended that Congress continue government controls on the importation, allocation, and specification of the uses for natural rubber in order to protect the national interests of all Americans.

Emphasizing that stabilizing controls on rubber maintained by the government are scheduled to expire March 31, Mr. Litchfield declared that the importation-allocation-specification powers were closely interdependent. It is difficult to comprehend how any one of them might be relaxed without sacrifice of the over-all objectives. It is disturbing to contemplate any piece-meal dismantling of the control structure which has so well served our national needs. Certainly, we have the national prudence to preserve these controls until such time as they can be relaxed with the assurance of safety, he said.

Consideration of the following three major and inter-related factors was stressed by the Goodyear chairman in order to understand how national interests are involved: (1) There should be full and complete protection for our national synthetic rubber plants to the end that they will always be readily available to our needs; (2) Receipts of natural rubber from the Far East will be short of national consumption during at least the first six months of 1947, a fact which calls for maintenance of controls; (3) The War Powers Act, under which present stabilizing controls are maintained by the government, expires March 31, 1947, or several months in advance of the earliest date at which we can expect an adequate supply of natural rubber.

Mr. Litchfield pointed out that harsh necessity brought about the basic rubber controls, which make government the sole purchaser of natural rubber and fix upon government the attendant responsibilities for allocating these supplies to the processing industries. Government is able to keep importation and allocation in balance through its power to specify the uses to which both imports of natural rubber and the production of synthetic rubber may be placed.

The best obtainable estimates for 1947 placed world natural rubber imports to the United States at 110,000 long tons in the second quarter and consumption at 125,000 long tons, according to Mr. Litchfield. This supply deficit was described as an invitation to speculative excesses costing the American consumer of rubber products millions of dollars. The only satisfactory protection we have against such a boom-and-bust period in the rubber market is for the government to continue its control over purchase and importation.

Referring to the present price of natural rubber, the Goodyear executive declared that at 20¼ cents a pound the price in producing markets was entirely fair to the foreign producer, even though a small group of international speculators would like to see it go higher. The price would rise if we dropped our guard at this particular time, he added, but higher prices would not increase the supply of rubber and our interests are concerned with the protection of the American consumer against such an exploitation.

Considering why this speculative danger is so probable when the combined supply of natural and synthetic rubber is adequate for our total needs, Mr. Litchfield reasoned that a tire made exclusively from natural crude rubber would have customer preference over one containing large proportions of synthetic rubber. No American tire manufacturer willingly will permit his competitor to have such an advantage. Consequently, if natural rubber should be placed in a free market before there is an adequate supply, bidding for the limited quantity available would be active and persistent.

The argument is not for keeping these controls in perpetuity, he asserted, but only long enough to permit the restoration of natural economic balances. March 31, 1947, was deemed too early for the abandonment of rubber controls, including government purchases, in America. Accordingly, Mr. Litchfield recommended that the provisions of the War Powers Act, insofar as it pertains to rubber controls, be continued in effect for some time after that date.

Test Specifications

Opinions, criticisms, and suggestions in regard to test paragraphs in QMC specifications are currently being solicited by the Quartermaster Corps. As part of its peacetime scientific research program the OQMG is reviewing the directions for, and methods of, testing, as contained in its numerous specifications with a view to bringing them in line with the latest developments in scientific and industrial fields. All comments on this subject should be addressed to: The Quartermaster General, Attention: Specifications Section, Research and Development Branch, Military Planning Division, Washington 25, D. C.

California Elects Officers

George B. Farwell, of the Goodyear Rubber Co., San Francisco, and Ross E. Morris, senior rubber technologist at the Mare Island Navy Shipyard, were elected chairman and vice-chairman, respectively, for 1947 at a recent meeting of the Northern California Rubber Group. R. J. Henderson, of the American Rubber Manufacturing Co., was elected secretary-treasurer.

COLLYER URGES PROMPT ACTION FOR LAW ON SYNTHETIC RUBBER

A strong plea for prompt and appropriate action, taken at the law-making level, to make sure that America shall never again become a "have-not" nation with respect to rubber was made by John L. Collyer, president of the B. F. Goodrich Co., in a pamphlet entitled "Remember December Eleventh," issued recently by the company. Mr. Collyer pointed out that on that date in 1941 America's World War II rubber famine began, and that we should "Remember the Rubber Famine" as well as "Remember Pearl Harbor" in keeping alert to national security needs.

According to the Goodrich executive, natural rubber may be available late in 1947 in such quantities that the actual, physical need for general-purpose synthetic rubber may fall off very sharply; then our facilities for making rubber on this side of the world could languish and disappear unless our government takes positive action. If this happens, we shall have allowed one of the nation's most dearly-won security "insurance policies" to lapse. Synthetic rubber was first described as an "insurance policy" by Mr. Collyer on June 5, 1940, when he unveiled the first synthetic rubber passenger car tire ever put on general sale in this country.

Regarding the building up of a large new stockpile of natural rubber as a security measure in itself, Mr. Collyer noted that it might take the country four or five years to accumulate even a reasonably adequate stockpile of natural rubber. To prevent the nation's rubber insurance policy from "going by default," he urged definite, decisive action soon on the nation's policy on that insurance.

The views of the Goodrich organization regarding any future synthetic rubber program were summarized as follows: Regardless of strictly economic factors, Congress should give early consideration to the adoption of a program assuring that (1) The government's efficient facilities for the manufacture of synthetic rubber be maintained in stand-by condition, ready to be run on immediate notice; and (2) A sufficient tonnage of synthetic rubber for the maintenance of national security be made and used each year.

Beyond these provisions for security, Mr. Collyer said that the principle of competitive enterprise should prevail, because the free play of economic forces will do more than anything else to spur research and development of all types of rubber, to broaden ther usefulness, and to make more and better products available to more and more people.

How a new heating system was especially designed and installed to blend with its surroundings in the plant of the Seiberling Rubber Co. at Barberton is the subject of an article in the latest issue of *Trane Weather Magic*, house organ of the Trane Co., LaCrosse, Wisconsin.

Amendment to Rubber Order

Under the terms of the latest amendment to Rubber Order R-1, issued on January 30, natural rubber latex now is permitted in rubber cement used in some shoe manufacturing processes when specifically authorized by the Civilian Production Administration. Because of the extremely short supply of such latex, permission for its use in cement for shoes must be limited to cases in which it is demonstrated that lack of the material is preventing the production of shoes of adequate quality. The amendment provides that a shoe manufacturer requesting permission to use natural rubber latex cement must present his case on CPA Form 2242, including full details as to manufacturing operations and the technical reasons requiring the use of latex in specific operations. When authorization to use natural rubber latex cement has been received, the shoe manufacturer may obtain the cement from a rubber cement manufacturer only by furnishing a written certification of authorization to consume. Latex cement manufacturers may not sell their product to shoe manufacturers who have not supplied proper certification.

Introduces Pliolite S-6

A new general purpose rubber reinforcing agent for extruded and molded products and calender-coated fabrics has been introduced by the Goodyear Tire & Rubber Co., Akron. Known as Pliolite S-6, the reinforcing agent is a synthetic resin which is said to have particular value in the manufacture of rubber insulated wire. The manufacturer claims that the inclusion of Pliolite S-6 as a reinforcing agent makes possible the use of a wide variety of colors in rubber products, in contrast to those produced with conventional carbon black In addition, the resin is reported to improve stiffness and hardness, abrasion resistance and, when used at elevated temperatures, the processibility of rubber stocks, preventing their shrinkage on cooling.

Form New G-E Wire Division

The wire and cable divisions formerly operated at York, Penna., and Bridgeport, Conn., by the General Electric Co. have been consolidated into a new wire and cable division, with headquarters at Bridgeport. A. W. Gilmore, formerly assistant to the general sales manager of the G-E Appliance and Merchandise Department, has been appointed manager of the new division and will be responsible for its engineering, manufacture and sales activities. Assisting Mr. Gilmore in the new division will be S. T. Powell as manager of manufacturing, C. O. Hull as engineer, A. E. Newman as manager of the Bridgeport sales section, and M. H. Owen as manager of the York sales section.

Decorative Jar Rings

Rubber jar rings are becoming popular as bracelets in Africa, according to the U. S. Rubber Export Co. Natives in the Cape Province, unable to obtain brass wire to make metal ornaments, are buying black and red jar rings by the thousands, some wearing them both on arms and ankles. The company has sold more than a half million rings for adornment purposes during the past twelve months and the demand is expected to continue. Sufficient jar rings to meet domestic canning needs are available.

Develops New Antioxidants

A new line of antioxidants has been developed by the Benson Process Engineering Co., Eden, N. Y., for use in rubber compounding. Designated as PDA (poly diaryl amines), the new line consists of PDA-8, a liquid at room temperature, PDA-10, a fluid at temperatures above 50° C., and PDA-14, a fine, granular free flowing solid. PDA-8 and PDA-10 are reported to be superior to antioxidants of the phenyl B naphthyl amine group in regard to the anti-flex cracking, heat resistance, and oxygen aging properties they impart to rubber. PDA-14 is especially recommended by the company for use in light colored stocks.

Poly-Tint Plastics Stains

Wilmington Chemical Corp., 10 East 40th St., New York 16, N. Y., has developed a new type of stain for the coloring of various plastics by dipping methods. Two types of the stain, called Poly-Tint, are available. The first type, the 600 Series, is designed for coloring cellulose acetate, cellulose acetate butyrate, ethyl cellulose, polyvinyl chloride, and other materials in the same class, while the second type, the 700 Series, is designed for coloring methyl methacrylate and polystyrene. Both types are produced in four standard colors, namely red, blue, yellow, and black, from which any other color may be produced by blending.

Chicago to Hear Shattuck

Robert Shattuck, of the Marbon Corporation, will be the featured speaker at the next meeting of the Chicago Rubber Group, to be held on Friday, March 21, at the Morrison Hotel in Chicago. Mr. Shattuck will deliver an address on rubber-to-metal adhesion. Motion pictures of the 1946 Indianapolis Speedway race and on the building of a tire, both by courtesy of Firestone, will also be shown. A meeting will also be held on May 9 at which officers will be elected and a technical talk of some kind will be given.

Vinyl Resin Stabilizer SN

A new stabilizer, designed primarny for use as an inhibitor of the discoloration and embrittlement which occurs in films or masses of vinyl resins when heated, has been developed by the Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y. Designated as Stabilizer SN, the new stabilizer is said to be effective with both vinyl chloride polymers and the chloride acetate copolymers, and to be an effective aid to high temperature processing or service conditions in fabric coatings, films on metal, and in extruded plastics. It is amber in color and has a specific gravity at 23° C. of 1.056. Advantages claimed for Stabilizer SN by the company include the following; negligible effect on color or shade of dyed or pigmented stocks; no sedimentation or precipitation on storage; and negligible fire hazard because there is no volatile solvent present.

Vinylite Organosol Coatings

A new series of technical coatings, which are adaptable for application in the textile, paper, and foil industries, is being manufactured by the Watson-Standard Co., Pittsburgh 12, Penna. The coatings, known as Vinylite Organosols, are reported to be highly resistant to water, grease, oil, chemicals, and heat, and to be adaptable to any baking cycle. Chemically inert, non-toxic, and tasteless, the coatings are produced either in a variety of colors or water clear, and are said to impart an attractive high gloss surface that is free from creases and cracks. Typical applications include luggage, paper table cloths, window shades, drapes, food packages, and other containers.

Singapore Office Re-Opened

The crude rubber purchasing office of the B. F. Goodrich Co. in Singapore, Straits Settlements, Malaya, which was closed early in 1942 when the Japanese over-ran the Malayan Peninsula, has been re-opened by the company, with George M. Naylor as managing director. Mr. Naylor is widely known in the crude rubber trade, where he has spent practically all his career. He was on the Goodrich crude rubber purchasing staff from 1929 to 1942, when he retired, much of that period being spent in Malaya.

"Vanderbilt News" Resumes

After a suspension of several years, *The Vanderbilt News*, popular and informational house organ of the R. T. Vanderbilt Co., has resumed publication. S. S. Rogers is the new editor. The first of the new issues, dated January-February, 1947, is devoted to a discussion and a tabular summary of the properties of each of a number of materials developed and introduced by Vanderbilt since the last issue published in 1942. Some new test methods are also discussed.

SUPPORTING INDUSTRY'S PROMISE

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Our Research employs unique and specialized equipment. Apparatus has been originated by the laboratory staff and many refinements have been added to conventional rubber testing machinery.
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NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those listed in our last issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue.

X-No. Designation	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-347 GR-S	General, Baytown	12/26/46	Same as GR-S Black I except that Mooney viscosity of unpigmented polymer will be 30 ± 5.	The use of this type of carbon black masterbatch may eliminate one processing step and the necessity of handling free pigments resulting in cleaner operation should show superior processing and handling characteristics with better dispersion of pigment. Due to lower Mooney, quicker breakdown should be obtained with X-347 than with GR-S Black I. GR-S Black I is a mixture of 100 parts of a low viscosity GR-S and 50 ± 2 parts of EPC black.
X-353 GR-S	Copolymer, Baton Rouge	12/16/46	Activated GR-S polymerized at lower temperature to lower conversion, 50 Mooney.	Lower temperature necessary for an activated recipe during polymerization and lower conversion generally favor processing; 50 Mooney viscosity. This polymer will be used as control for X-354 GR-S in tire treads.
X-354 GR-S	Copolymer, Baton Rouge	12/16/46	Polymerized under same condition as X-353 but has a 90-100 Mooney viscosity.	Higher Mooney variation of X-353 GR-S is expected to produce better wear in tires.
X-356 GR-S	U. S. Rubber, Institute	1/10/47	Black masterbatch with 100 parts of a polymer made with mixture of rosin acid and fatty acid soaps; 50 parts EPC black; 38 Mooney; 1.5 BLE.	Mixture of rosin acid and fatty acid soap expected to give better processing; i.e., rosin acid soap to provide better tack, and the fatty acid soap to reduce sticking to the mill. Similar to X-314 GR-S. Insufficient supply for general distribution.
X-357 GR-S	U. S. Rubber, Institute	1/10/47	GR-S 10 in SRF black masterbatch.	For use in carcass compounding. Insufficient quantity for general distribution.
X-358 GR-S Latex	U. S. Rubber, Naugatuck	1/8/47	Similar to X-239 GR-S Latex except using a mixed wood rosin soap emulsification; normal solids content.	This latex differs from Type III in that it has a slightly lower styrene content and a Mooney range of 50-75.

Producing Specification Goods

Bond Rubber Corp., 326 Derby Ave., Derby, Conn., which was organized in March, 1946, has reported that production of its custom molded rubber goods for the electrical, hardware, and automotive industries is well underway. Robert A. Podoloff, formerly vice-president in charge of operations at the Paragon Rubber Corp., is president of the company, and John J. Groves, formerly a chemist at the Detroit, Mich., plant of the U. S. Rubber Co., is vice-president.

Accident Prevention Manual

National Safety Council, 20 North Wacker Drive, Chicago 6, Ill., has made available a new manual, entitled "Accident Prevention Manual for Industrial Operations," which is intended as a handy source of accident prevention information for safety directors, safety engineers, and foremen. The manual is available to both members and nonmembers of the Council.

Establishes Texas Division

Monsanto Chemical Co. has announced the formation of a new manufacturing division, to be known as the Texas Division, with headquarters at Texas City, Texas, and Joseph R. Mares as general manager. The 50,000-ton capacity styrene plant at Texas City, which the company purchased from the War Assets Administration in August, 1946, for $9,550,000, will form a nucleus for the new manufacturing division. A polystyrene plant to produce the plastic molding powder is being installed by the company at Texas City in buildings formerly owned by the Texas Sugar Refining Co. adjacent to the styrene plant. Production of the first polystyrene plastic is expected shortly.

A brief history of the construction and development of the Union Pacific Railroad has been made available in booklet form by the Union Pacific Railroad, Omaha 2, Nebraska.

Furetone 5510 Plasticizer

Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington 11, N. J., has developed a new plasticizer, called Furetone 5510, which is finding application in the compounding of nitrile rubbers. According to the company, use of the plasticizer results in products of high tensile strength with good elongation and a Shore hardness from 80 to 87. The plasticizer is said to be resistant to oils and mineral spirits.

Organize Advance Rubber Co.

Hector S. Bruder, for the past eight years associated with the Wilson Packing & Rubber Co., Minneapolis, as superintendent and production manager, has organized his own rubber manufacturing company under the name of Advance Rubber Co., 929 Washington Ave, South, Minneapolis 15, Minn. The new company will produce molded goods, and will also job extruded rubber, rubber sheet, gloves, aprons, tubing, etc.

NAMES IN THE NEWS

J. C. VOILES, who has been chief engineer of the Plant Rubber & Asbestos Works, San Francisco, for the past several years, has been appointed a division manager with jurisdiction over the entire East and Midwest territories.

HUBERT ROYER, who was associated with the General Ceramics & Steatite Corp. as sales engineer for twenty-seven years, has been appointed sales manager of the Chemical Stoneware Division of the U. S. Stoneware Co., New York City.

ALBERT A. GARTHWAITE, president of the Lee Rubber & Tire Corp., has been elected to the board of governors of the Commodity Exchange, Inc., New York City.

DR. M. L. CROSSLEY, director of research of the Calco Chemical Division, American Cyanamid Co., has been selected to receive the 1947 Gold Medal of the American Institute of Chemists.

DR. WESLEY S. COE, research chemist of the Naugatuck Chemical Division, and J. W. WILKINSON, of the Connecticut Hard Rubber Co., have been elected chairman and treasurer, respectively, for 1947 of the New Haven Section of the American Chemical Society.

GLENN SMITH, formerly war contract terminator for the General Tire & Rubber Co., and previously associated with the sales department, has been appointed manager of the company's export division.

C. E. WILSON, formerly associated with the Reeves Rubber Co., has been named general manager of the Latex Seamless Products Co. and the Golden State Rubber Mills, both in Los Angeles, Calif.

T. E. ALLEN, until recently executive vice-president and general manager of the Brake Lining Manufacturers Association, has been appointed to an important executive position with the Thermoid Co., Trenton 6, N. J.

WILFRED F. L. PLACE, formerly chief of laboratory of the Guayule Rubber Extraction Research Unit at Salinas, Calif., recently joined the executive staff of the Durex Abrasives Corp., New York City.

J. R. "ROY" KEATING, popular sales representative of the Binney & Smith Co., New York, recently completed twenty-five years of service with that company and was inducted as a member of the company's 25-year club at a special dinner party.

THOMAS F. BURNS, formerly associated with the United Rubber Workers of America, and more recently assistant director of the CIO Political Action Committee, has joined the Aldan Rubber Co., Philadelphia, in an executive capacity.

ROBERT P. RUSSELL, president of the Standard Oil Development Co., will receive the Cadman Memorial Medal from the Institute of Petroleum. The medal is awarded at least once every three years for scientific contributions in the field of petroleum.

JERRY J. TOBIAS vice-president of Allen Industries, Inc., Detroit, Mich., has been appointed general manager of all company operations.

DR. WILLIAM P. YANT, director of research of the Mine Safety Appliances Co., Pittsburgh 8, Penna., and internationally known for research in safety and health, has been chosen the 1946 recipient of the Pittsburgh Award, which is bestowed annually by the Pittsburgh Section of the American Chemical Society for outstanding service to chemistry.

R. W. NICKELS, associated with the B. F. Goodrich Co. since 1927, most recently as national manager of budget sales, has been named manager of the company's drug sundries sales.

MILTON RADCLIFFE, formerly associated with the Firestone Industrial Products Co., has joined the O'Sullivan Rubber Corp., Winchester, Va., as technical director of the recently organized plastics division.

D. D. COCHRANE, chief engineer of Godfrey L. Cabot, Inc., has received a citation from the War Department "for outstanding contribution in the development of a satisfactory substitute for Shawinigan carbon black for use in dry cells during World War II."

JAMES P. HENDERSON, who was associated with the C. J. Tagliabue Co. for nineteen years in research and development work and as division manager, has joined the Gotham Instrument Co., Inc., 149 Wooster St., New York 12, N. Y., as general manager and chief engineer.

WARREN H. HACKETT, formerly manager of the company's insurance and real estate department, and E. A. DOERSCHUK, who has been a member of the credit department of the company's treasury division for thirty years, have been appointed assistant treasurers of the B. F. Goodrich Co., Akron.

ROBERT M. TYLER, who has been associated with the Athol Manufacturing Co., Ansonia, Conn., as assistant manager, has been named sales manager of the company.

ARTHUR B. PIKE, who was a partner in the Arthur Pike Co. from 1938 to 1946, has been appointed Boston, Mass., area representative by Farrel-Birmingham, Inc., with headquarters at 1736 Massachusetts Ave., Lexington, Mass. He will handle the sale of gears and gear units.

HOWARD JORDAN, president of the Pennsylvania Rubber Co., Jeanette, Penna., a subsidiary of the General Tire & Rubber Co., Akron, has been elected director of the parent company.

JOHN R. HOOVER, vice-president of the B. F. Goodrich Chemical Co., Cleveland, Ohio, has been elected president of the Plastic Materials Manufacturers Association, Inc.

JOHN L. COLLYER, president of the B. F. Goodrich Co., has been elected chairman of the Business Advisory Council of the Department of Commerce for 1947.

LOUIS F. ROSCHAY, formerly with the Dryden Rubber Co. and the Lamb Rubber Corporation, has been named production superintendent of the rubber division of the Phoenix Manufacturing Co., Joliet, Ill.

Ontario Group Sees Films

Despite inclement weather, the meeting of the Ontario Rubber Section of the Chemical Institute of Canada held on January 29 at the University of Toronto was one of the best attended of those held by the group. The evening was known as "Film Night" and was devoted to the presentation of five interesting and diversified films. These included films shown through the courtesy of Goodrich, Goodyear and U. S. Rubber, as well as two by courtesy of the Westinghouse Electric Co., one of which was on current applications of electronic equipment.

Offer Surplus Neoprene

The Birmingham Region of the War Assets Administration has 225,000 pounds of GR-M (neoprene) available as surplus. The neoprene is unused and is packed in 50 pound cardboard cartons. Inspection is invited and samples will be supplied on request on company letterheads. Further information can be secured from the Chemicals Section, War Assets Administration, P. O. Box 2090, 1955 Fiftieth St., North, Birmingham, Alabama.

MINUTES OF RUBBER CONSULTING TECHNICAL COMMITTEE MEETINGS

For some time the Civilian Production Administration (now a section of the new Office of Temporary Controls) has been holding meetings with consulting technical personnel concerned with the manufacture of specific types of rubber products. Some inkling of these meetings has appeared from time to time in this journal.

Lately, certain of the technical personnel of the Office of Rubber Reserve have been requested to attend these meetings for the primary purpose of answering questions relating to the use of synthetic rubbers. Specifically, that part of the meeting attended by ORR personnel has been devoted almost entirely to the problems which rubber manufacturers are having with synthetic rubber with respect to product quality and manufacturing difficulties.

The characteristics of synthetics which are not as satisfactory as desired have been pointed out and discussed. Where possible, recommendations have been made to the committee members for the better usage of GR-S or for the substitution of special GR-S types that show promise of being better than GR-S for the special needs of each specific group. Based on open discussions at these meetings, certain changes in polymerization have been attempted resulting in better copolymers to meet specific problems.

As these meetings progressed, it became obvious that publication of the minutes would be of substantial help to others in the industry who were not in attendance at the meetings. In order to help these and others who may benefit from such information, and as a service to the industry, RUBBER AGE has agreed to publish, either in full or in part, the minutes of that portion of the meeting attended by ORR representatives.

In all cases the dates of the meetings, and the names of the Government presiding officers and the committee chairman, will be shown in connection with the minutes. Those wishing to make comments or secure further information may do so by contacting any of the individuals named.

One factor which should be emphasized is that these meetings, by nature of their purpose, do not reflect the favorable side of synthetic rubbers, and this thought should be borne in mind by the reader.

The minutes of three recent meetings follow:

Meeting of the Coated and Combined Fabrics Consulting Technical Committee. Held: December 12, 1946. Government Presiding Officers: A. R. Miller (CPA), M. J. Tierney (ORR). Chairman: Harold Nelson (U. S. Rubber).

In an open discussion, the problems associated with the calendering and spreading technique for coating fabrics were considered. Non-staining and non-discoloring type GR-S was desired for practically all products of this type. It was concluded that an ideal polymer for calendering operations would have the following characteristics:

1. Low volatile matter (moisture).
2. Equivalent to GR-S-25 in non-staining properties.
3. Process as well as GR-S-60 (formerly X-285 GR-S).
4. Equivalent to GR-S-50 in heat aging.
5. The adhesion to fabrics of a rosin soap polymer without sticking on mill and calender rolls.
6. Rate of cure to be equal to natural rubber.

In physical properties this "ideal polymer" should have a low modulus. Tensile strength, elongation and hysteresis were not considered important factors for most of these uses.

Approximately 3000 pounds of an experimental pilot plant copolymer, XP-60, which will approach this ideal will be prepared at the Akron Government Laboratories for distribution to members of the committee in about 200 pound samples. Manufacturing conditions will be based upon GR-S-50 polymerization conditions with the following exceptions: (1) IBUL, a new type non-staining stabilizer; (2) Cross-linking agent; and (3) Emulsifier composed of two parts of fatty acid soap and three parts rosin acid soap.

For present investigations it was suggested that properties approaching the ideal polymer might be obtained with blends such as: (1) X-273 and X-344, (2) GR-S-50 and X-344, (3) GR-S-25 and X-344, (4) GR-S-50 and GR-S-25 or X-273.

The committee suggested that it was believed that the staining properties of a rubber compound decreased exponentially with a linear reduction in anti-oxidant. This would suggest that improved properties could be obtained by blending GR-S-50 with GR-S-25 or X-273, which combinations would have superior resistance to staining than that produced with GR-S-50 and better aging properties than exhibited by GR-S-25 or X-273. X-273 would also increase the tackiness of the stocks. X-344 in blends with GR-S-50 should improve processing, staining characteristics, and heat aging, as well as increasing the rate of cure.

It was pointed out that the properties of blends of GR-S and natural rubber could be improved by compounding each rubber separately to give equivalent plasticates and rates of cure and then blending the same just before the *final processing step*. 50-50 blends of natural rubber and GR-S-50 were reported to be considerably better than all rubber compounds in aging and non-staining properties as determined in a fadeometer and in evening out the large variability in rate of cure of the natural rubber now obtainable. Non-reverting natural rubber stocks may be compounded by using 25 parts GR-S to 75 parts rubber with proper acceleration.

Some preference for GR-S-50 to natural rubber for hospital sheeting was indicated by service performance. It was also stated that generally speaking GR-S-50 compounds were about 2½ times better than similar natural rubber compounds in 250° F. heat aging tests. Recent difficulties in dispersion of mineral fillers in GR-S-50 were attributed to moisture in the polymer.

The committee pointed out that at the same viscosity GR-S spreading dough could be made in higher concentrations than natural rubber. Except for its staining properties, GR-S-85 was considered to be very satisfactory for spreading compounds. XP-61, a non-staining variation of GR-S-85, will also be prepared at the Akron Government Laboratories with IBUL as a stabilizer and an emulsifier composed of 2 parts fatty acid soap and 3 parts rosin acid soap. Approximately 800 pounds of this polymer will be prepared for distribution through the committee chairman.

Non-staining type spreading doughs using X-272 or X-304 were suggested for investigation. Both are 100 Mooney rosin soap polymers which are stabilized with Stalite. The former has a normal monomer ratio and exhibits exceptional water resistance and electrical properties. X-304 is a high styrene copolymer which has a higher freeze point than standard monomer ratio polymers.

The committee did not comment on the use of GR-I for coating fabrics. However, the very successful experience in military products in the past few years and its ready availability at this time would suggest development of GR-I for civilian products of this type.

Meeting of the Leather Shoe Manufacturers Consulting Technical Committee. Held: December 18, 1946. Government Presiding Officers: A. R. Miller (OTC), L. A. Woerner (ORR). Chairman: G. B. Britton (International Shoe).

The committee reported that the leather shoe manufacturers used rubber in the form of adhesives at the rate of eight and one-half pounds (solids) per 1000 shoes prewar and seven pounds (solids) per 1000 shoes during the period of maximum restrictions. Of this quantity approximately ⅔ is procured as latex and ⅓ as solvent cements. This ratio is determined primarily by the types of equipment available. Practically all of these latices and cements are compounded as non-curing adhesives. Due to its low film strength very little GR-S is being used in these applications. GR-M forms the bulk of the synthetic rubber consumed. It was also pointed out that a large percentage of the adhesives procured has to be obtained several months ahead of actual application.

The properties of natural rubber films whether applied from latex or solvent cement which were missed the most during the period when consumption of all synthetic rubber was necessary include the following:

1. *Tack and Tack Retention*—The

initial tack of GR-M latex cements is excellent but it is followed by a rapid decline with time which reduces its efficiency under normal operating conditions. The use of resins to increase the tack in GR-M results in reduced film strength. GR-S shows deficiencies in both properties.

2. *High Film Strength*—GR-M is commonly used because it has this property. At the present state of development, GR-S latex cement exhibits very low film strength.

3. *Easy Removal of "Roll-off" from Equipment and Hands*—This slows production in keeping equipment clean and results in dermatitis in many cases when the film is removed from the hands. In the case of GR-S and GR-M this is caused by the method of removal, i.e., repeated use of solvents and strong soaps. The large quantity of caustic or basic chemicals used in GR-M latices as stabilizers and possible other toxic materials incorporated therein tend to result in dermatitis. Natural rubber rubbed off quite readily.

Other factors which the committee felt contributed to the manufacturing difficulties encountered when synthetics were used included staining of non-rubber components of the shoe, the slow drying of synthetic latex films, the variable stability of solvent cements and the separation of blends of synthetic and natural rubber latex adhesives after standing for relatively short periods.

In consideration of the roll-off problem, it would appear that GR-S with low film strength and GR-M, in spite of its high film strength, show greater adhesiveness than cohesiveness. In natural rubber these properties appear to be reversed resulting in easy "roll-off." In a direct comparison of natural rubber and GR-M, both of which have a comparable high film strength there are indications that GR-M after application has considerably better adhesiveness than natural rubber. This is illustrated by direct comparisons in many applications where GR-M adhesives are superior in strip back adhesion.

It was stated that although GR-S is not very important in the over-all picture for these applications it could be satisfactorily consumed for low film strength uses if they could be removed from the hands more readily. Because of this low film strength GR-S is more difficult to remove or "roll-off" than GR-M.

One committee member stated that GR-M latex could be compounded to produce tack which would last for one week. In his opinion the trouble with GR-M is that it is too stable and that quick drying could be obtained by destabilization, pressure agitation being one method by which this might be accomplished. In some cases these cements were suitable for use while still wet. He felt that too much emphasis was being placed on getting back to natural rubber latex rather than thoroughly trying out synthetics.

Gelling of GR-M cements is sometimes caused by the resins used in compounding. The ideal resin would give a stable cement. Care must also be exercised in avoiding metallic containers containing lead in the inside coating or in high phosphorus glass containers, both of which are known to cause gelling.

The committee was unanimous in agreeing that separation occurs upon shipping when both GR-S and GR-M solvent cements and latices are blended in natural rubber cements or latex. These blends are often satisfactory when used within two days. This might be anticipated if the blends were made with natural rubber latex stabilized with a protein material such as casein which may be non-compatible with the stabilization system used in the synthetic latices. It would appear desirable to compound natural rubber latex for blends with stabilizers which will not tend to coagulate or cream or form unstable blends with the synthetic rubber latices.

Properties agreed upon which would result in definite improvement in GR-S latices are:

1. Large particle size.
2. As high a concentration as possible with goal at 60% solids.
3. Improved tack and tack retention.
4. Higher film strength obtainable now only by high Mooney and high conversion.
5. Dry with transparent color and be non-staining.
6. Speed up drying time.
7. Must be compatible in blends with natural rubber.

It was indicated that high styrene content seemed undesirable in attempting to develop a film with more legs, at least using the present emulsifiers. It was felt that less emulsifier and one of a different type using a lower styrene content might produce desired results.

Present specifications in the development of improved GR-S latices are now requiring larger particle size. Large particle size latices in high concentrations are desired because they are more fluid (lower viscosity) than smaller particle size latices in the same concentrations. The particle size of natural rubber latex is considerably larger than the standard GR-S latices (Types I, II, III, and IV).

Because synthetic latices have been described as slower drying than the natural rubber latices it is speculated that particle size also may be the factor controlling this condition since the soaps used as emulsifying agents in GR-S latices would lower the surface tension and speed up the drying time of the GR-S film. There is also some indication that the poor stability of blends of natural and GR-S latices may be caused by the fact that the smaller particle size synthetic rubber latex may tend to steal the emulsifier from the natural rubber latex, thereby producing an unstable situation.

Research and development work is now underway on a polymerization system requiring no emulsifier. This project is being accelerated and pilot plant samples are expected in the near future. When these are available the committee members will be advised and samples made available for their evaluation.

The preparation and use of GR-M and GR-S cements have been found to be more expensive than natural rubber. GR-M being considerably more solvent resistant than either natural rubber or GR-S requires additional processing to put it into solution. The low film strength of GR-S necessitates the use of thicker coats of cement to obtain satisfactory strength. In addition higher concentration of solids are required than for natural rubber to give a similar viscosity. These factors all contribute to the higher costs. GR-S is in some cases more soluble than natural rubber.

It is to be noted that according to the Rubber Division of Civilian Production Administration the dry rubber solvent cement pattern has been for some time established in accordance with the long term recommendations of the Inter-Agency Policy Committee on Rubber (Batt), i.e., to use one-third synthetic to the total of natural plus synthetics and that to date this pattern has been operating satisfactorily.

Meeting of the Rubber Toy Consulting Technical Committee. Held: December 19, 1946. Government Presiding Officers: A. R. Miller (OTC), L. A. Woerner (ORR). Chairman: E. C. Brueggeman (Seiberling Latex Products).

Soon after the meeting was opened it became apparent that several of the companies represented had not been manufacturing rubber toys during the war, but had produced other rubber products using similar methods of manufacture. The remainder of the committee indicated that toy production using the available synthetic rubber had been continued in their plants during the war. Under these conditions a limited amount of development work had been done in seeking improved products by utilizing the various special-purpose and experimental polymers now available.

It was pointed out that the Rubber Reserve program included provision for help in the development of new polymers for special uses by coordinating industry research and development for improved GR-S types to meet the specific requirements of this segment of industry as well as for the other branches of the industry.

The committee concurred that it desired an improved low-shrinkage, tacky GR-S. There were also requests for a better processing polymer for chemically blown sponge rubber, and for a GR-S latex which could be blended satisfactorily with natural rubber latices.

The first of the above to be discussed was the tacky, low-shrinkage polymer which would be expected to have superior calendering and milling characteristics. The following properties given in their relative order of importance

seem to present the more desirable characteristics:

1. More bounce or rebound (resilience).
2. Improved tack and bonding strength, and longer tack retention.
3. Low shrinkage.
4. Non-discoloring.
5. Non-blooming.
6. Improved hot tear resistance.
7. Non-toxic (GR-S is not known to be toxic).

To approach this standard, GR-S-60 (formerly X-285-GR-S) and its non-staining variation, X-344-GR-S, were suggested as improved processing and low shrinkage polymers. These were not recommended, however, for chemically blown sponge applications. In addition, the committee was advised that a superior processing polymer, XP-60, is being made up at the Government Laboratories in Akron as a tackier variation of X-344-GR-S. XP-60 will contain IBUL, a new type non-staining stabilizer, a cross linking agent and an emulsifier composed of two parts of fatty acid soap and three parts of rosin acid soap. Samples of XP-60 which was originally under development for the Coated and Combined Fabrics Consulting Technical Committee will be forwarded to committee members as soon as available. These polymers are faster curing than standard GR-S. X-344-GR-S and XP-60 are expected to be faster curing than GR-S-60.

For rubber toys utilizing chemically blown sponge XP-59 was recommended. XP-59 is a low Mooney tertiary mercaptan modified polymer designed to eliminate excessive breakdown and was developed for the Chemically Blown Sponge Rubber Consulting Technical Committee as an improved processing GR-S. One report from the latter committee indicates encouraging results for this pilot plant polymer.

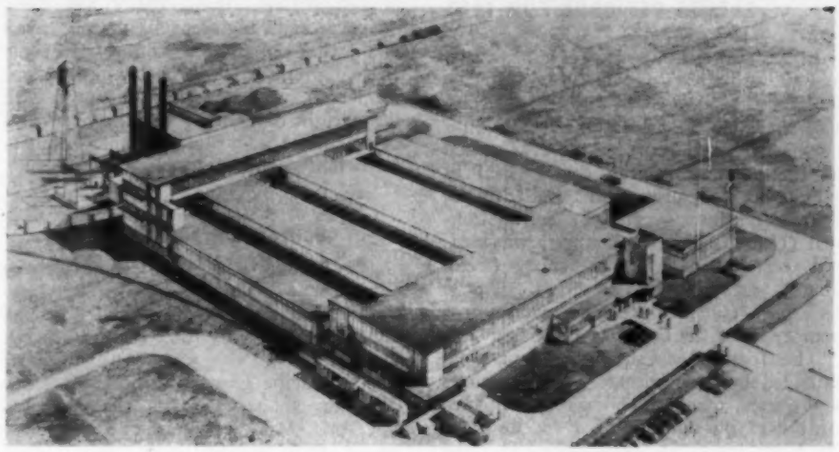
Work is now underway in the Rubber Reserve program on the development of a polymerization system for improved GR-S type latices in which no emulsifier is used. When samples are available, the committee will be so advised. It is expected that this system will best approach the following conditions which the committee felt were most desirable:

1. Low emulsifier.
2. Large particle size similar to Type V Latex.
3. High concentration, 60%, if possible.
4. Relatively stable.
5. Good elongation in films.

The committee was advised by the Office of Temporary Controls that appeals for natural rubber latex would be considered for development work on blends with synthetic latices. It was suggested that in work on blends a careful study should be given to stability as some stabilizers used in natural rubber latices appear to be incompatible in many instances with those of synthetic latices. Thus care should be taken in choosing compatible stabilizers for best results in blending.

The committee indicated that GR-M is being used on inflated type products. Fairly good adhesion is thereby obtained although seaming properties are sometimes variable. When using GR-M greater processing costs are encountered, and it is not possible to make products in light colors. It is often necessary to lacquer balls to get desired colors and finishes. The oil resistant synthetic rubbers give most trouble in adherence of lacquers to the product. GR-M balloons are more difficult initially to inflate although they will hold air longer than natural rubber balloons. They also tend to stiffen when shipped during cool weather.

THERMOID PLANT AT NEPHI, UTAH, REPORTED NEARING COMPLETION



Artist's sketch of the new Thermoid plant at Nephi, Utah

Some information relative to the new mechanical rubber goods plant being built by the Thermoid Co. at Nephi, Utah, has been made available by the company. The plant, which will be operated by the Thermoid Western Co., will comprise 200,000 square feet of space, with the main manufacturing building totaling 165,000 square feet. For the most part, manufacturing will be concentrated on V-belts, fractional h.p. belts, conveyor and transmission belting, and oil field products. Molded hose products will include air, water, and steam hose, wire hydraulic molded hose, and woven radiator hose. A special building for the production of certain types of brake lining is also planned. Total employment is expected to be between 500 and 600. W. D. Pardoe, Thermoid vice-president, is in charge of construction of the Utah plant, which is expected to be in production by the middle of the year, barring any unforeseen difficulties.

Velasco Purchase Approved

The purchase of the government-owned styrene plant at Velasco, Texas, by the Dow Chemical Co. from the War Assets Administration has been given final approval by the Department of Justice. Addition of the new facility will give the company a styrene capacity in excess of 200,000,000 pounds annually. However, acquisition of the Velasco property is not expected to result in an immediate increase in the volume of polystyrene. Although synthetic rubber requirements are gradually diminishing, the company plans to continue the shipment of approximately three-fourths of its Velasco production to Rubber Reserve for an indefinite period.

Goodyear Using New Accelerator

With the recent production of its 400,000,000th pneumatic tire, the Goodyear Tire & Rubber Co. disclosed that it was using a new accelerator in current tire production. Called "Butrax," the new accelerator is reported to further equalize the effect of temperature variations both inside and outside the casing in the tire curing process. This in turn further reduces the possibility of tread cracking and ply separation. Because of the patent situation, the chemical composition of Butrax has not as yet been revealed. Samples are not yet available to the trade, but Goodyear plans on making the new accelerator generally available in the near future.

Leases Lake Charles Plant

Mathieson Alkali Works has leased with an option to purchase the government-owned ammonia plant at Lake Charles, La. The plant, which has been in stand-by condition since the fall of 1945, will require about four months before it can be put into operation. Unlike other large ammonia plants, this plant utilizes natural gas as its source of hydrogen and fuel, and is not dependent upon remote sources of materials such as coal, a factor which has interrupted production in other areas. The company anticipates further diversification of its products as a result of the new acquisition.

PHILADELPHIA RUBBER GROUP ELECTS OFFICERS FOR 1947

L. K. Youse, of the L. H. Gilmer Co., and W. B. Dunlap, Jr., of the Lee Rubber & Tire Corp., were elected chairman and vice-chairman, respectively, of the Philadelphia Rubber Group for the 1947 season at the meeting of the group, held at Kugler's Restaurant in Philadelphia, Penna., on January 10. T. T. MacConnell (U. S. Rubber Reclaiming) was elected treasurer and W. E. Abbey (Firestone) was named secretary. Merle Gallaway (Quaker Rubber) was elected a member of the board of directors.

The featured speaker at the meeting, attended by approximately 125 members and guests, was Dr. Thomas L. Williams, of the rayon division of E. I. du Pont de Nemours & Co., who discussed "The Properties and Use of Rayon." An abstract of Dr. Williams' talk follows herewith:

Viscose rayon is simply cellulose arranged in the convenient form of long fibers. The properties of the fibers are determined by the complete history of the cellulose, both chemical and physical. By altering this history, the important properties such as luster, dyeing, water absorption, strength, elongation, and fatigue resistance, can be varied individually over wide ranges. The types offered for sale are specially devised for particular markets.

This sensitivity to history gives to the manufacturer an opportunity to accentuate the desired properties and to make a very uniform product. It also imposes an obligation to control all processes carefully, which extends to those who make finished products from viscose yarns.

The types now used in the reinforcing cords of automobile tires are replacing cotton because of their high strength per unit of weight or size and their resistance to heat and flexing. These same advantages are available in reinforcing many other products and sometimes with more dramatic results.

As yarns for braiding into hose, cords for V-belts, and as fabrics for diaphragms, hose, transmission belts and conveyor belts, high tenacity viscose rayon is showing remarkable promise. In some cases, its high strength in low gauge gives properties which cannot be achieved with any weight of cotton. In others, savings in weight of fiber and elastomer result in important ecomomies. - End of abstract.

California Hears Robson

The January Meeting of the Northern California Rubber Group, which was held at Angelo's Restaurant in Oakland, Calif., on January 30, featured J. J. Robson, manager of manufacturers' sales of the Pacific Coast Division, Firestone Tire & Rubber Co., as the principal speaker. Mr. Robson spoke on "Synthetic Tires in War and Peace." Profusely illustrating his talk with slides, Mr. Robson described the extreme conditions under which tires were tested and operated during the war, both on test runs in the United States and under combat conditions in the several theaters of operations. Synthetic tires in both passenger and truck size were said to have done an admirable job during the war. While tire mortality was high in all combat zones, the major portion of failures was attributed to shell fragments which damaged the tires of natural rubber in the same way and to the same extent as those made of synthetic rubber. A few problems remain in the larger sizes but smaller tires were described as quite satisfactory. Mr. Robson's talk was followed by the showing of a motion picture, entitled "The Making of a Tire."

Buffalo Names 1947 Officers

Election of officers for 1947 at the recent Christmas Party and Meeting of the Buffalo Rubber Group resulted in the following: *Chairman*, A. H. Davis (Dunlop Tire); *Vice-Chairman*, E. R. Briggs (Hewitt-Robins); *Secretary-Treasurer*, D. Meier (Dunlop Tire).

Among those present at the meeting of the Northern California Rubber Group, held on January 30 at Angelo's Restaurant in Oakland, Calif., were, left to right: Ross Morris (Mare Island Navy Yard); J. J. Robson (Firestone); Dr. Fritz Rostler (University of Delaware); and Major Harold Vance (U. S. Army).

ROWZEE IS FEATURED SPEAKER AT MEETING OF QUEBEC GROUP

Approximately 60 members and guests heard A. R. Rowzee, director of research and marketing of the Polymer Corp., Sarnia, Ontario, deliver a talk on "Future Prospects of Synthetic Rubber," at the meeting of the Quebec Rubber and Plastics Group, held at the Ritz Carleton Hotel in Montreal, Quebec, on January 9.

In his talk, Mr. Rowzee first described his two-month trip to Europe at the end of 1946 to study the GR-S situation, and then discussed the results of the international rubber study group at The Hague, Holland. The two chief conclusions reached at the latter meeting were: (1) No over-supply of natural rubber is expected for the next two or three years; and (2) Synthetic rubber is considered better than natural rubber for certain uses. From these and other considerations, it appears that price will dictate whether natural or synthetic rubber will be used.

European nations generally recognize GR-S and GR-I as important new materials and will use them willingly, provided that supply and prices are satisfactory, the speaker stated. As for Germany, the synthetic rubber industry in that country will no longer be a factor in the world picture since all synthetic rubber plants regarded as a war potential will be dismantled.

Discussing the plans of Polymer Corp., Mr. Rowzee stated that the Canadian plant will definitely remain government-operated and that everything is being done towards the development of new, better, and cheaper synthetics. The company's research program is following three distinct paths, first, the development of specific rubbers for the consumer, secondly, the development of better basic types of rubber, and thirdly, investigation of plant problems with a view to higher production and better rubber. As for equipment, the company was said to have complete facilities for "test tube to plant" development.

Akron to Meet February 21

The Winter Meeting of the Akron Rubber Group will be held on Friday evening, February 21, at the Mayflower Hotel in Akron. The featured speaker at the meeting will be John L. Strohm, formerly president of the American Association of Agricultural Editors, who will discuss "The People Behind the Iron Curtain."

Price of Perbunan Increased

An increase in the price of Perbunan dry rubber has been announced by the Enjay Co., Inc., 26 Broadway, New York 4, N. Y. Under the new price schedule, Perbunan 18 ranges in price from 39c to 41.5c per pound, depending upon quantity, Perbunan 26 from 40c to 42.5c, and Perbunan 35 from 47c to 49.5c. Prices are slightly higher on the West Coast.

TECHNICAL REPORTS AVAILABLE FROM THE DEPARTMENT OF COMMERCE

Listed below is information on additional reports of industrial and technical developments which occurred throughout the world during the wartime period. This information is taken from the "Bibliography of Scientific and Industrial Reports" issued by the U. S. Department of Commerce, and copies of the reports listed may be secured, at the prices indicated, from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Remittances made payable to the Treasurer of the United States must accompany money orders. Titles of the more recent reports follow:

Applications of Perduren G and H. In German. Directions by I. G. Farbenindustrie for the preparation of a Perduren G and H vulcanizable hard rubber. Enlargement print of part of Microfilm 185-2.—Report No. PB 19331. 14 pp. Photostat, $1; Microfilm, 50c.

Comparison of Vulkacit AZ with Other Accelerators. In German. Test results of various vulcanizates by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-2.—Report No. PB 17606. 12 pp. Photostat, $1; Microfilm, 50c.

Diorthotolylguanidine or Vulkacit DOTG. In German. DOTG compared with Vulkacit D by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-2.—Report No. PB 17636. 1 p. Photostat, $1; Microfilm, 50c.

Preparation of Isoprene in the "Merling"—Apparatus 0 106. In German. Description for a laboratory preparation of isoprene by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-2—Report No. PB 17632. 22 pp. Photostat, $2; Microfilm, 50c.

Oxide Wax. Reports on use of the material in high grade rubber mixtures in sprayers and calenders. Enlargement print of part of Microfilm 185-2.—Report No. PB 17637. 1 p. Photostat, $1; Microfilm, 50c.

Testing of Rubber. Description of a standard procedure to determine the elasticity of soft rubber with the help of a pendulum hammer. Enlargement print of part of Microfilm 178-1.—Report No. PB 17631. 1 p. Photostat, $1; Microfilm, 50c.

Testing of Adhesive Properties According to German Patent No. 734493 Dated Apr. 29, 1943. In German. Detailed description of four different tests. Enlargement print of part of Microfilm 182-5.—Report No. PB 16330. 2 pp. Photostat, $1; Microfilm, 50c.

Method of Producing Synthetic Rubber. In German. Patent application by I. G. Farbenindustrie for the preparation of synthetic rubber by polymerizing a mixture of butadiene and the methyl ester of methacrylic acid in a neutral or acid medium at about 25°C. Enlargement print of part of Microfilm 185-1.—Report No. PB 17616. 7 pp. Photostat, $1; Microfilm, 50c.

Method of Preparing Easily Cementable Vulcanizates of Rubber. Patent application by I. G. Farbenindustrie for the preparation of a vulcanizate of natural or artificial rubber which is cementable to rubber, leather, metals and other surfaces by addition to the vulcanization mixture of non-vulcanizable substances which have rubber-like properties and good adhesion. Enlargement print of part of Microfilm 182-5.—Report No. PB 16359. 8 pp. Photostat, $1; Microfilm, 50c.

Rayon Cord Tire Carcasses. Report of tests conducted by the Development Division of the U. S. Ordnance Department in Detroit, Mich., in November, 1945, to determine the quality of rayon cord as compared with cotton cord, and to determine the serviceability of the new 2200 denier, 2-ply rayon cord.—Report No. PB 19850. 29 pp. Photostat, $2; Microfilm, 50c.

German Protective Clothing, Heavy Type. By Vincent Panariello and others. —Report No. PB 27502. 9 pp. Photostat, $1; Microfilm, $1.

Mobile Tire and Tube Repair Unit. Report of project undertaken by U. S. Ordnance Department from October, 1943, to June, 1944, to develop the equipment for a mobile tire and tube repair unit for overseas operation.—Report No. PB 23799. 8 pp. Photostat, $1; Microfilm, 50c.

Plasticizer for Chlorinated Rubber. In German. Correspondence concerns certain I. G. Farbenindustrie and United States patents on the use of high molecular weight polymers of isobutylene. Enlargement print of part of Microfilm 182-5.—Report No. PB 16363. 12 pp. Photostat, $1; Microfilm, 50c.

German Neoprene. By M. A. Youker and N. A. Copeland. Typewritten report in English which mainly describes production at Hoechst of monovinyl acetylene (MVA), its chlorination to form 2-chloro-1, 3-butadiene (chloroprene or CD) and the polymerization of CD to form neoprene.—Report No. PB 19857. 374 pp. Photostat, $25; Microfilm, $4.

Manufacture of Hard Rubber Parts for Storage Batteries and Battery Ventilating Equipment for German Submarines. By S. P. Fisher. Report No. PB 23187. 26 pp. Photostat, $2; Microfilm, 50c.

Gunfire Tests of Self-Sealing Materials for Chemical Tanks. By H. O. Huss. Memo Report 389 of Technical Division, Chemical Warfare Service.—Report No. PB 23152. 26 pp. Photostat, $2; Microfilm, 50c.

Excerpts and Short Notes on Rubber Mixtures. In German. Consists mainly of formulas for the preparation of rubber mixtures, cements, varnishes, and coatings, taken from patents or patent applications of I. G. Farbenindustrie. Enlargement print of part of Microfilm 182-4.—Report No. PB 16360. 47 pp. Photostat, $4; Microfilm, 50c.

Method for the Production of Artificial Materials. In German. Document was prepared for application as a patent by I. G. Farbenindustrie for method of obtaining artificial materials with rubber or celluloid-like properties by polymerization of dichlorobutadiene. Enlargement print of part of Microfilm 182-6.—Report No. PB 16361. 15 pp. Protostat, $1; Microfilm, 50c.

Method for the Production of Vulcanizable Mixtures from Organic Substances which Form Films. In German. Document was prepared for application as a patent by I. G. Farbenindustrie for obtaining viscous to solid, fusible polymers of an unsaturated character as residues when butadiene or its derivatives are heated to higher temperatures with or without catalysts and pressure. Enlargement print of part of Microfilm 182-6.—Report No. PB 16344. 23 pp. Photostat, $2; Microfilm, 50c.

Reclamation of Torn Tubes and Valves. Project report of work by U. S. Ordnance Department from June, 1942, to January, 1943, to determine the advisability of repairing and resplicing torn tubes.—Report No. PB 23798. 15 pp. Photostat, $1; Microfilm, 50c.

Synthetic Rubber Plant, Schkopau (near Merseberg). By R. T. Barbera. Report of a visit to one of the first plants erected for the quantity production of synthetic rubber and allied products in Germany, which achieved production capacity in 1939.—Report No. PB 18151. 31 pp. Photostat, $3; Microfilm, 50c.

Method for the Production of Synthetic Materials. In German. Covers I. G. Farbenindustrie patent and the preparation of polymers of β Chloroprene. Enlargement print of part of Microfilm 182-6.—Report No. PB 16364. 41 pp. Photostat, $3; Microfilm, 50c.

Procedures for the Determination of Gel Content, Swelling Index and Dilute Solution Viscosity of GR-S Polymer. By J. W. Mullen, II, and W. O. Baker. This is a report of work done at the Bell Telephone Laboratories.—Report No. PB 9680. 7 pp. Photostat, $1; Microfilm, 50c.

Hard Rubber Tray. By L. C. Smith. The object of the work covered by this report was to determine the impact, tensile and hardness properties of a sample hard rubber tray submitted by the Photographic Laboratory at Wright Field, Ohio.—Report No. PB 7149. 3 pp. Photostat, $1; Microfilm, 50c.

Spinning of Tire Yarn, Vereinigte Glanzstoff Fabriken, Obernburg a. Main. By G. P. Hoff and others.—Report No. PB 14518. 3 pp. Photostat, $1; Microfilm, 50c.

Rubber Substitute for Life Rafts. By Charles J. Brick. This report is on a conference of representatives of the Office of the Rubber Director, Bureau of Aeronautics, Materiel Command, and industry to determine the amount of crude rubber to be used in multi-place pneumatic life rafts.—Report No. PB 11695. 2 pp. Photostat, $1; Microfilm, 50c.

NEWS IN BRIEF

The Department of Commerce in New York City has moved its offices to the 60th floor of the Empire State Building, 350 Fifth Ave. The telephone number at the new location is LOngacre 3-7000.

An egg basket, made of lightweight steel wire coated with rubber, has been developed by U. S. Rubber to reduce breakage during the collection of eggs from nests.

An all-plastic clothesline made of black and white Velon plastic strands has been introduced by Firestone. The new clothesline is said to be sunproof and waterproof, and will not sag nor stretch.

Farrel-Birmingham Co., Ansonia, Conn., has made available a new bulletin, entitled "Farrel Gearflex Couplings," which describes various types of couplings for use in industrial and marine service.

A plastic dog leash fashioned from rayon cord coated with Geon plastic is being manufactured by Jessall Plastics, Hartford, Conn.

Acme-Hamilton Rubber Manufacturing Co. and its subsidiary, the Acme Rubber Manufacturing Co., have opened a New York office in the Woolworth Bldg., 233 Broadway, New York 7, N. Y. The telephone number is BArclay 7-1974.

A booklet describing the company's wood and marble recreations in plastic veneer has been made available by the Meyercord Co., 307 North Michigan Ave., Chicago 1, Ill.

LifeGuard safety tubes for both passenger buses and trucks and puncture sealing tubes in both truck and passenger car sizes are again being produced by Goodyear.

An all-purpose rubber sponge made of neoprene is being produced for the consumer market by the Oliver Processing Co., 1580 East Slauson Ave., Los Angeles, Calif. Called Keen-Klean, the sponge is said to have an 85% water absorption, with a specific gravity of 75.

Plastics bottle caps and seals that are said to afford a new protection to chemicals during shipment and storage have been introduced by the General Electric Co.

A new bulletin, which discusses the use of drying equipment in the industrial field, has been made available by the Pittsburgh Lectrodryer Corp., Box 1766, Pittsburgh 30, Penna.

A burnproof ironing board made of Asbeston, a new type of asbestos fabric, is being manufactured by the Dominion Rubber Co., Kitchener, Ont. The company claims that the new ironing board cover is washable, and that its surface will not deteriorate with use.

Construction of a new pilot plant to further plastics research is under way in Springfield, Mass., by the Monsanto Chemical Co. The new building, to cost an estimated $175,000, is expected to be completed during the summer of 1947.

Banks Moreland Co., Houston, Texas, tank manufacturer, has been acquired by the Graver Tank & Manufacturing Co., East Chicago, Ind., and will continue to operate in the Southwest as a division of the latter company.

Two catalogs, one of magnetic pulleys and another on magnetic brakes for floor, motor, and machine mounting, have been made available by the Stearns Magnetic Manufacturing Co., Milwaukee 4, Wisc.

A new technique of packaging fresh fruit has been developed by Goodyear, in conjunction with Wayne University. The foundation of this new method, called the Hammock Pack, is formed of two sheets of cardboard covered with a sheet of Pliofilm.

Heyden Chemical Corp. has opened a sales office at 1700 Walnut St., Philadelphia, Penna.

New plastic upholstery, known as Heavy Duty Naugahyde, is being manufactured by U. S. Rubber for heavy duty transportation seating. Advantages claimed for the upholstery are long wear, outstanding abrasion resistance, and excellent flexing and tailoring properties.

"How to Use Carbon Tetrachloride Safely: Tips to the Foreman" is the title of a new booklet issued by the Safety Research Institute, 420 Lexington Ave., New York 20, N. Y. It discusses the proper handling and storage of carbon tetrachloride.

For the second successive year, the Dayton Rubber Manufacturing Co., Dayton, Ohio, has been awarded the "Oscar" in the competition conducted by *Financial World* for the best annual report to stockholders in the rubber industry.

Goodyear has developed a rubber "finger" for poultry dressing machines which is said to enable one machine to defeather 5,000 fowl per hour.

A new type of conveyor belt, covered with silicone rubber, has been developed by the Connecticut Hard Rubber Co., New Haven, Conn., for use in food processing.

Carr Manufacturing Co., Bristol, R. I., recently received CPA approval to erect a one-story building which will house $100,000 worth of rubber-covering machinery.

American Foundry Equipment Co., Mishawaka, Ind., has changed its corporate name to American Wheelabrator & Equipment Corp., thus bringing the name "Wheelabrator," one of the company's principal products used for cleaning and finishing metal articles, into the corporate title.

Goodyear Aircraft Corp., Akron, has completed plans for the construction of prefabricated one-story aluminum homes for war veterans at costs ranging from $5,000 to $6,500. The buildings will include a kitchen, two bedrooms, a living room-dinette, and a bathroom.

A catalog describing wartime developed safety devices for reducing fire and explosion hazards has been issued by the Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill.

Cellular rubber is being manufactured by U. S. Rubber for insulating refrigerators and freezing units. The material is said to be lighter and more effective than cork as an insulator.

G & A Aircraft, Inc., Willow Grove, Penna., which was acquired by Firestone in 1943, has changed its name to the Firestone Aircraft Co. Roger S. Firestone is president.

Rubber stamp manufacturers have established a cooperative business association in New York City to advance the standards of the industry and to solve mutual problems collectively.

A new type rubber compound for printing plates, which is said to be particularly adapted to job press printing and to have wide application in the box and bag printing industry, is being produced by Goodyear.

The "Rubbermaid" Toilet Top Tray, Wooster, Ohio, which is reported to be a fast seller in the household field, is now available in a new carton designed as a self-selling display piece.

Some interesting details on the new Dillon Mechanical Pressure Gauge are supplied in a new bulletin recently made available by W. C. Dillon & Co., 5410 W. Harrison St., Chicago 44, Ill. Copies are available without cost on request.

New York Meets April 11

The next meeting of the New York Rubber Group will be held on Friday, April 11, at the Hotel McAlpin, in New York City. As usual, it will be held in the afternoon, and will be followed by dinner. At least two papers will be presented during the meeting itself. At a meeting of the Executive Committee of the group, held on January 22, it was voted to increase membership dues to $2.00 per year. A program committee was named consisting of A. P. Stubbs (Manhattan Rubber), G. S. Haslam (N. J. Zinc), G. C. Maasen (Vanderbilt), P. P. Pinto (RUBBER AGE), and J. E. Waters (General Cable), chairman. It was decided to hold the summer outing on Friday, June 20. Pete Murawski (DuPont) will act as chairman of the Outing Committee, assisted by H. Frecker (U. S. Rubber), F. E. Traflet (Pequanoc), D. E. Jones (American Hard Rubber), T. Callahan (Witco), and C. T. Jansen (RUBBER AGE). No golf tournament will be held at the outing, but Jean Nesbit (U. S. Rubber Reclaiming) was named as a committee of one to contact several local golfers to determine whether the group should sponsor a separate golf tournament in July or August. S. M. Martin, Jr. (Thiokol) was appointed a one-year member of the Executive Committee to replace J. E. Waters, who is automatically a member in his position of vice-chairman of the group.

Koppers Acquires Petrolia Firm

Koppers Co., Inc., Pittsburgh, Penna., has acquired almost all of the outstanding shares of the Pennsylvania Coal Products Co., Petrolia, Penna. Operation of the latter company will continue under the same name, and with the same management of Charles F. Hosford, Jr., as president, and Carl H. Pottenger as vice-president. E. S. Ruffin, Jr., secretary of Koppers, and E. A. Berry, treasurer of Koppers, have been elected secretary and treasurer, respectively, of the acquired firm. Present products of the Petrolia plant include resorcinol resins, sodium sulfite, catechol, and other fine chemicals. An expansion program is under consideration to increase both production and variety of products manufactured.

New GE Divisions Established

General Electric Co. has established a plastics division and a compound division to take the place of the plastics division in its chemical department at Pittsfield, Mass. George P. Lehmann, who has been assistant manager of the plastics divisions since May, 1946, has been appointed manager of the plastics division, while John L. McMurphy, who has been manager of the phenol plant of the plastics division at Pittsfield since 1942, has been named manager of the compound division. Both men will make their headquarters in Pittsfield.

Machinery Statistics

According to the Bureau of Census, twelve plants in the rubber-working and tire-retreading machinery industry, estimated to account for approximately 90% of the activity of the entire industry, shipped products valued at $2,627,000 and employed 4,014 persons during June, 1946. These shipments included rubber-working and tire-retreading machinery valued at $2,037,000, and other products valued at $590,000. Estimated unfilled orders of the industry as of June 30, 1946, was placed at $26,500,000, of which $14,000,000 was for rubber-working machinery, $2,000,000 for tire-retreading machinery, and $10,500,000 for other products.

Additional Barrett Reports

Two additional technical reports in its current series of bulletins on its rubber compounding materials have been issued by the Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N.Y. Laboratory Release No. 4 presents data on BRS 700, a new softener and extender of the solvent and swelling type which is said to confer good hysteretic properties, improve processing, calendering and tubing properties, and also improve resistance to tear and crack-growth. Laboratory Release No. 5 offers compounding information on the behavior of the M.S. R.H. and M.H. grades of Cumar in GR-S-channel black stocks and the effect of Bardex and BRH No. 2 in GR-S stocks. Copies of the reports are available from the company on request.

Portal Pay Suits Increase

Although one of the last major industries to be faced with portal-to-portal pay claims, the rubber industry is gradually assuming its share of such suits. At this writing the B. F. Goodrich Co. is faced with two suits, one for $23,525,000 brought by an individual "on behalf of self and all other employees similarly situated," and the other for $26,000,000 filed by the Goodrich local of the U.R.W.A. A $24,640,000 suit is on file against the Firestone Tire & Rubber Co., brought by the Firestone local of the union. Both locals are in Akron. Seiberling Rubber Co. is also faced with a $1,482,000 suit. U. S. Rubber also has some suits pending.

Boston Meets on March 14

The Spring Meeting of the Boston Rubber Group will be held on Friday, March 14, at the Hotel Somerset, Boston, Mass. An interesting program is now being arranged. B. H. Capen, of the Tyer Rubber Co., Andover, Mass., is secretary-treasurer of the group.

New Consulting Committees

Two new consulting technical committees were recently named by the Office of Temporary Controls. One of these is the Athletic and Sporting Goods Equipment Consulting Technical Committee, consisting of C. E. Carlson (Pennsylvania Rubber) as chairman, and including the following members: J. G. Havey (Wilson Sporting Goods), Carl Lundgren (MacGregor-Goldsmith), W. J. O'Brien (Seamless Rubber), C. A. Webb (Weaver-Wintark), L. C. Weimer (Voit Rubber), and L. W. Isom (Dewey & Almy). The second committee named was the Leather Shoe Manufacturers Consulting Technical Committee, of which G. B. Britton (International Shoe) is chairman, and which includes the following members: H. M. Spelman, Jr. (Dewey & Almy), R. G. Ashcraft (Endicott Johnson), R. M. Freydberg (Acme Backing), R. D. Earle (Union Bay State), W. Reardon (Daniel Green), M. P. Medwick (N. Y. Rubber Cement), and J. C. MacKay (McElwain Co.). The name of the Protective Clothing Committee has been changed to the Coated and Combined Fabrics Consulting Technical Committee.

Marlor Elected to RMA Board

At the annual meeting of the Rubber Manufacturers Association, held at the Waldorf-Astoria Hotel in New York City on January 7, H. S. Marlor, vice-president of the U. S. Rubber Co., was elected to the board of directors, succeeding F. B. Davis, Jr., chairman of the board of U. S. Rubber. A. L. Viles, president, and the other officers of the Association, as well as six board members, were re-elected at the meeting. The board members re-elected for terms expiring in 1949 were as follows: George B. Dryden (Dryden Rubber); E. B. Germain (Dunlop Tire); P. W. Litchfield (Goodyear); William O'Neil (General Tire); and J. J. Newman (Goodrich). Frank D. Hendrickson (American Hard Rubber) was re-elected to fill a term expiring in 1948. The Board consists of fifteen members, elected for three-year terms in groups of five.

Firestone Introduces New Rim

Firestone Steel Products Co., Noblesville, Ind., has announced the development of a new wider rim for trucks and buses, the use of which is said to result in an increase up to 40% in original tread mileage. An outstanding feature claimed for the new rim is a 5° taper on each side which makes possible the locking of both sides of the tire bead to the rim, thus virtually eliminating the rock and sway of the tire, and greatly reducing rim rust and corrosion. Tests by the company have indicated that up to 30% of the increased tread mileage is due to the wider rim, while an additional 10% of wear is added by the elimination of tire wobble.

Plastics Industry in Germany

A comprehensive collection of technical documents tracing the development of the German plastics industry since 1930 has been made available by the Office of Technical Services of the Department of Commerce. The documents consist of minutes and reports of meetings of the Plastics Commission, which was comprised of experts from the marketing, consumer, and manufacturing branches of I. G. Farbenindustrie. In their search for new products and substitutes for old ones, the research technicians of I. G. Farbenindustrie developed synthetic rubbers, paints, waxes, glues, resins, textile fibers, insulating materials, shellacs, emulsifiers, and many other synthetic products. The reports provide a chronological record of the technical development of these products, and include information on production costs, marketing problems, technical difficulties, patent procedures, and industrial applications. The documents have been consolidated on microfilm reels and are also available in enlarged photostat prints. All of them are in German, and are known as the "KUKO" reports.

British Association Formed

The Federation of British Rubber Manufacturers' Associations has been formed to take over the functions of the Federation of British Rubber and Allied Manufacturers' Associations. The objectives of the new Association are to promote commerce by safeguarding the interests of those concerns engaged in the manufacture of rubber products and reclaimed rubber in the United Kingdom, and to act as a central means of communication with British and other governments and other bodies. The original number of members is limited to 100.

Flocking Adhesive M-6177

A new synthetic rubber adhesive has been developed by the U. S. Rubber Co for use in conjunction with textile fibers to make plush, velour, suede, and velvet surfaces. The adhesive is said to have longer life and more flexibility than base coat enamel adhesives now being used. Called Flocking Adhesive M-6177, the adhesive can be dyed any color to match the textile fibers and may be sprayed or brushed on wood, metal, glass, and other surfaces. It is intended for use with rayon, cotton, or wool flock.

Bonding Vinyl Sheet Stock

"Vinyl-Lastic," a new type of adhesive designed for bonding vinyl sheet stock, has been introduced by Permalastic Products, Centerline, Mich. The new adhesive is said to be unique in that the bond produced is not deteriorated by vinyl plasticizers. Use of the adhesive is said to produce excellent adhesion of vinyl to itself as well as to metal, wood, leather, etc. No heat or pressure is required.

MARCH OF DIMES

Roll for Steel Mill Pickling

A new roll for steel mill pickling lines has been developed by the Goodyear Tire & Rubber Co., Akron. Known as the Goodyear Special Hold-Down and Carrying Roll, the new roll utilizes an inner cover of a newly developed fibrous material, which guards the steel core from contact with acid, and a synthetic rubber outer cover on the weight-carrying surface, which is unaffected by acids. The fibrous material is said to be sufficiently hard to absorb the shock of practically all cuts to which pickling tanks are subjected, while remaining immune itself to damage from acids seeping through the gash. The roll's synthetic rubber surface is bonded to the fibrous material, which in turn is bonded to the roll core and cover for the roll's life by a newly developed bonding process.

Meadol Lignin Fraction

For the past few years the Mead Corporation of Chillicothe, Ohio, has been carrying on an extensive investigation of lignin and is currently manufacturing a lignin fraction which is marketed under the trade name of "Meadol." Recent investigations are said to indicate that the material has potentialities in the rubber field both as a compounding ingredient and as a mold lubricant. Furnished in the form of a fine brown powder, Meadol has an apparent density of 25 to 35 lbs. per cubic foot, a melting point of 210° to 235° C., a moisture content of less than 5%, and an ash content of less than 0.5%. It is currently being used in the manufacture of plastic products and as an organic expander in the negative plates of storage batteries.

Rubber sink stoppers, the output of which was sharply curtailed during the war, are now being produced by U. S. Rubber at the rate of 5,000,000 a year, which is five times greater than the pre-war rate.

Standard Stan-Tone Colors

A new and unique series of coloring materials has been introduced by the Harwick Standard Chemical Co., Akron, for use in the manufacture of rubber and plastics products. The coloring materials, known as Stan-Tones, are supplied only as masterbatches of coloring pigment dispersed in a plasticized resin. The masterbatches are not only reported to be compatible with natural rubber and every type of synthetic rubber but also with all of the vinyl resins and with other types of thermoplastics. Advantages claimed for the Stan-Tones by the company are: more uniform color in the final product; no loss of color from the intended batch, and no contamination of other batches due to flying dust, spillage from open containers, or use of dirty scoops. The coloring materials are available in varying shades of red, yellow, orange, blue, and green.

To Build Polystyrene Plant

The construction of a polystyrene plant with an annual capacity of 15,000,000 pounds is being planned by the Koppers Co., Inc., at Kobuta, Penna. The new plant, which is to be constructed adjacent to the company's present styrene and phthalic anhydride facilities at Kobuta, is expected to be completed in approximately one year. Koppers now is producing polystyrene commercially on a small scale at its Kobuta chemical plant, and expects to make first shipments of this material within the next few weeks. Small commercial production from these facilities will continue until the large plant is in operation.

Additional Hercules Bulletins

Three additional technical bulletins in its current series of experiments comparing various GR-S-10 stocks with those of GR-S have been issued by the Hercules Powder Co., Wilmington, Delaware. The new bulletins contain data on GR-S-10 and GR-S stocks loaded with fine thermal black (Bulletin No. 5), the age resistance of stocks loaded with 30 volumes of hydrated alumina (Bulletin No. 6), and the age resistance of stocks loaded with 20 volumes of calcium silicate (Bulletin No. 7). Copies of the bulletins are available on request to the company.

Firm Formed in Cleveland

A new concern, the Cleveland National Rubber Corp., 2001 Center St., N. W., Cleveland 13, Ohio, has been formed to engage in the manufacture of friction tape, rubber tape, rubber cements, and sponge rubber products. Officers of the new concern include: President, Earl R. Hendricks; Vice-President, Louis J. Zsoka; Assistant Vice-President, John Rigo, Jr.; Treasurer, Frank C. Hendricks; and Secretary, Thomas V. Hagaman. The company plans to start production soon on a number of extruded rubber articles.

Data on GR-S-60

Some information on GR-S-60, formerly X-285 GR-S, has been issued by the Office of Rubber Reserve, RFC. GR-S-60 is a terpolymer of butadiene, styrene, and a small amount of divinylbenzene. It differs from standard GR-S by virtue of a high gel content resulting from the addition of a cross-linking agent to the polymerization formula.

When compared to standard GR-S, GR-S-60 and its blends with GR-S exhibit the following characteristics: greatly reduced shrinkage (lower than natural rubber); reduced swelling at extrusion dies; improved surface appearance; improved retention of physical properties for aged vulcanizates; improved physical properties with reduced sulfur acceleration in non-black recipes; faster curing tendencies; cooler extrusion characteristics; and reduced requirements for Banbury or plasticator mastication.

GR-S-60 compounds are said to have lower tensile strength and elongation and higher flex crack growth than similar GR-S compounds. These properties may be improved by judiciously blending GR-S-60 with standard GR-S or special purpose GR-S copolymers.

GR-S-60 is being used in footwear, wire insulation, hard rubber products, coated fabrics, and mechanical goods, including extruded, calendered, and molded types, as well as a processing aid in blends with GR-S and special purpose GR-S copolymers for many rubber products. A non-staining variation of GR-S-60 has been developed as X-344 GR-S.

Establishes Graduate Fellowships

Graduate fellowships in chemistry have been established at ten leading universities by the U. S. Rubber Co. Under the terms suggested by the company, the fellow will receive $1200 per year if single and $1800 if married, with the university to receive $1000 to cover tuition and other costs. The universities which have accepted the fellowships include: California Institute of Technology, Cornell University, Harvard University, M.I.T., Northwestern University, University of California, University of California at Los Angeles, University of Chicago, University of Minnesota, University of Wisconsin.

Accessory Inflates Tires

The Ford Motor Co., Detroit, Mich., has introduced a new automobile accessory which will put out a fire or inflate tires. The new accessory is a small cylinder which contains 10 ounces of carbon dioxide under pressure. This is reported to be sufficient to put out a small oil fire or inflate three average tires. Replacement cylinders are offered by the company.

FINANCIAL NEWS

Firestone Offers Debentures

A new issue of $25,000,000 of twenty-five year debentures, intended to finance retirement of 4½% preferred stock, has been offered to the public by the Firestone Tire & Rubber Co. The debentures will bear interest of 2⅝% and are being offered at par. With funds raised by the bond sale, the company will retire at $105 a share 250,000 shares of the 414,000 outstanding shares of 4½% series preferred stock. Capitalization after this financing will consist of $40,000,000 of 3% debentures due in 1961, 164,000 shares of 4½% $100 par value preferred stock, 1,950,834 shares of common stock, and the new issue of debentures offered.

Spalding & Bros., Inc.

Year Ended October 31: Net income of $1,469,935, after providing $164,060 for interest on the 5% debentures and $1,315,531 for income taxes, which is equal to $2.82 a share on the common stock, and which compares with $882,483, or $1.85 a common share, for the previous fiscal year. Sales amounted to $19,480,017, as compared with the previous year's volume of $16,258,533. The consolidated balance sheet as of October 31, 1946, indicates current assets of $11,693,990 and current liabilities of $3,174,085, which compares with $10,222,777 and $1,835,248, respectively, a year earlier.

Lee Rubber & Tire Corp.

Year Ended October 31: Net income of $2,153,338, which is equal to $8.91 a share, and which compares with $1,206,594, or $5 a share, for the previous fiscal year. Reserve for contingencies was increased by $425,000 to $1,500,000 during the past year because of the sharp increase in cost of raw materials and increase in inventories.

Endicott Johnson Corp.

Year Ended November 30: Net income of $2,377,349, after deducting $1,350,000 for reserve adjustments, which is equal to $5.15 a common share, and which compares with $2,266,873, or $4.88 a common share, for the previous fiscal year. Sales amounted to $105,888,544, an increase of 3.71% over the $102,093,259 volume of the previous year.

Rome Cable Corporation

Nine Months Ended December 31: Net income of $735,048, which is equal to $3.68 a common share, and which compares with $217,899, or $1.14 a share, for the corresponding period of the previous fiscal year.

Sorbit P Wetting Agent

A flaked alkyl aryl sulfonate wetting agent, which finds application in the rubber industry, has been introduced by the Alrose Chemical Co., Providence 1, R. I. Called Sorbit P, the new wetting agent is reported extremely soluble in water, yielding thin, neutral solutions, which are colorless at 1% concentration or less. It is said to be stable in acid or alkali, and to show generally improved surface active properties in moderate concentrations of these as well as neutral electrolytes. When used alone, Sorbit P produces a copious but thin unstable foam; in the presence of electrolyte, the foam is more voluminous, dense, and stable. The material has a surface tension of 34 dynes/cm. in a 1% solution at 25° C., and a density of 0.3. Reports on the German wartime rubber industry indicate the widespread use of Sorbit P type products in polymerization processes. The agent is also recommended for wetting out and dispersing sulfur and pigments.

Glyco Leases Natrium Plant

The Marshall Chemical Warfare Service plant at Natrium, W. Va., which was used during the war for the large scale production of chlorinated aliphatic solvents and hexachlorethane, has been leased from the War Assets Administration by the Glyco Products Co., Inc. The plant, covering an area of over 84 acres adjacent to the Ohio River, is composed of fourteen buildings. Manufacturing operations are expected to start on or about March 1, 1947, the initial products being monochlorbenzene, ortho- and para-dichlorbenzenes, polyhydric alcohol esters, and special organic chemicals.

Reclaimers Re-Elect Officers

At the annual meeting of the Rubber Reclaimers Association, held at the Biltmore Hotel in New York City on January 21, William Welch (Midwest Rubber Reclaiming) and F. E. Traflet (Pequanoc Rubber) were re-elected president and vice-president, respectively, for 1947. Charles T. Jansen (RUBBER AGE) was re-elected secretary-treasurer. Jean H. Nesbit (U. S. Rubber Reclaiming) will head the Association's Executive Committee for 1947, with R. E. Casey (Naugatuck Chemical) and C. R. Shaffer (Xylos Rubber) comprising the remainder of the committee.

Essex Wire Obtains Loan

Essex Wire Corp., Fort Wayne 6, Indiana, has obtained a long term $7,000,000 3½% loan from the Metropolitan Life Insurance Co. The loan which was negotiated with the assistance of the C. I. T. Corp. and Lehman Bros., will be used by the company to increase its working capital, and to retire short term loans.

CANADIAN NEWS

The value of Canadian imports of crude rubber and rubber products, which began to increase in July, 1946, continued the upward trend in August and September, the total for nine months reaching $12,596,091, which compares with $12,328,981 in the first nine months of 1945. The increase in imports of rubber products was sufficient to more than offset a decrease of more than $3,000,000 in imports of natural rubber and more than $475,000 in synthetic rubber.

Imports of casings increased from $58,407 in the 1945 period to $1,096,478 in the first nine months of 1946; inner tubes from $3,797 to $69,866; and manufactures of rubber not otherwise provided for, a basket class, rose from $1,494,417 in the first nine months of 1945 to $2,103,770 in the first nine months of 1946. Increases in other imports appear to have been widely distributed and to have counterbalanced losses in other items.

On the other hand, Canadian exports of rubber and rubber products decreased throughout the first nine months of 1946 to $15,981,087 from $26,784,998 in the corresponding period of 1945. Rubber shipments, mainly synthetic, dropped from $7,829,829 in the 1945 period to $4,214,883 in the 1946 period; passenger car casings from $10,709,802 to $4,436,412 in the respective periods; inner tubes from $976,197 to $612,317; and manufactures of rubber not otherwise provided for from $1,916,898 in the 1945 period to $525,393 in the 1946 period.

The losses in these particular items exceeded the entire loss in the export trade, but gains in a number of other items partially counterbalanced these losses; for instance, a gain of approximately $850,000 accrued in exports of rubber belting and an increase of approximately $715,000 developed in exports of canvas shoes with rubber soles in the first nine months of 1946, as compared with the corresponding period of the previous year.

Goodyear Tire & Rubber Co. of Canada, Ltd., has announced the appointment of F. G. Wilmot as manager of tire sales and of J. M. Templeton as manager of the company's service department. In addition to his new duties, Mr. Wilmot will continue to direct the company's dealer development department.

Bakelite Co. of Canada, Ltd., 163 Dufferin St., Toronto, has been organized to take over the activities of the Bakelite Plastics Division of Carbide & Carbon Chemicals, Ltd. Management and personnel of the company remain unchanged.

F. H. Hopkins, who has been president and general manager of the Dominion Wire Rope & Cable Co. since it was organized eleven years ago, has resigned these offices to become chairman of the board. He has been succeeded by Thomas H. Westgarth, who has been director of the company for some years. The appointment of F. Wilson Fairman as vice-president also has been announced by the company.

The name of the Barringham Rubber Co., Oakville, Ontario, has been changed to Barringham Rubber & Plastics, Ltd. The change in corporate title was made in order to conform more closely to the expanded operations program which has been started by the company, involving an expenditure of approximately $750,000 on additional buildings, machinery, and equipment. It is expected that the additions will be completed and in operation by next fall, and that the expanded plant will employ about 500 persons.

An issue of $1,000,000 first (closed) mortgage bonds has been offered by Barringham Rubber & Plastics, Ltd., Oakville, Ontario. The issue consists of $500,000 15-year serial bonds, of which $300,000 bear 3% interest and $30,000 mature annually from 1948 through 1957, and $200,000 bear 4% interest, $40,000 maturing annually from 1958 through 1962. The remaining $500,000 bonds are 4½% 20-year sinking fund bonds, maturing in 1967.

The bonds are secured by a first mortgage on all the property, buildings, machinery, and equipment of the company, and by a first floating charge upon all of the company's other assets. The interest charges on the new bond issue will amount to $39,500 for the first year and will decrease each year as the bonds are retired. The proceeds of the bond issue will be used to pay for additional buildings, machinery, and equipment, the estimated cost of which is $745,000, and the balance of the proceeds will provide the company with additional working capital.

Marcus L. Brown, president of the Seiberling Rubber Co. of Canada, Toronto, has been appointed a member of the council of the Society of Automotive Engineers. Mr. Brown has been an officer of the society's Canadian affiliate for many years.

New Government Publication

The first issue of a new monthly magazine, called *Federal Science Progress*, covering the field of government-sponsored scientific and technological research has been made available by the Department of Commerce. The leading article in the first issue describes a method of making rapid surveys of the soil conditions on construction sites by the use of aerial photographs. Articles on the London Patent Conference, a German process for synthesizing petroleum fuels from coal and coke, wartime developments in the field of "tropicalization", and many others are also included in the initial issue. Single copies of the magazine and annual subscriptions are available through the Superintendent of Documents, Washington 25, D. C. The subscription price is $3 a year; single copies are 25c each.

Hevea Rigidifolia Rediscovered

Hevea rigidifolia, a species related to *Hevea brasiliensis*, was recently rediscovered in the upper reaches of the Amazon River Valley by botanists of the Agricultural Research Administration, U. S. Department of Agriculture, working with Brazilian botanists on the Cooperative Wild Rubber Selection Program. A British botanist, Richard Spruce, first found *Hevea rigidifolia* more than 100 years ago in northwest Brazil. Occurring sparsely, it grows apparently only on dry granite hills and sandstone mesas. The rubber plant investigators do not expect the rare *rigidifolia* to yield commercial rubber, but they expect that its unusual characteristics, including disease resistance and drought resistance, will make it valuable for primary crosses in the long range breeding program.

Names Canadian Representative

H. L. Blachford, Ltd., 977 Aqueduct St., Montreal, Quebec, has been appointed Canadian representative of the Philblack Division of the Phillips Petroleum Co. Harry A. Hencher is Blachford sales manager for the Quebec and eastern territory and J. Paul Hooper is manager of the company's Toronto, Ontario, office. Warehouses are maintained both in Montreal and Toronto so that prompt deliveries can be made of Philblack A and other products used by the rubber industry.

Chart on Carbon Blacks

A colorful chart illustrating the various grades of channel and furnace blacks offered by Godfrey L. Cabot, Inc., Boston, Mass., to the rubber, paint, paper, ink and other industries, has been made available by the company. Printed on celluloid for permanency, the chart depicts properties exhibited by the various blacks, and contains data on particle size.

Cable Suit Charges Monopoly

The Department of Justice filed a civil suit in Federal Court on January 30 charging four corporations with a conspiracy to monopolize and restrain trade in the high tension electrical cable industry in violation of the anti-trust laws. The defendants in the suit are the General Electric Co., the General Cable Corp., the Okonite-Callender Cable Co., and the Phelps Dodge Copper Products Corp. Named as co-conspirators were the Societa Italiana Pirelli of Italy and International Pirelli of Belgium. The monopoly charges are based on a type of fluid-filled cable in which the electrical conductor is surrounded by a sheath of oil or gas to prevent deterioration and loss of electricity. The defendants, the complaint asserts, created an illegal patent pool, fixed uniform prices in the United States, and entered into cartel agreements dividing the world markets with principal foreign producers. For their collective use, the defendants allegedly bought up patent rights relating to fluid-filled cable, excluded others from the industry and suppressed commercial exploitation in the United States of a superior and more economical type of gas-filled cable which has been widely used abroad Relief against patent abuses and cancellation of the agreements are asked.

Hi-Load Front Tractor Tire

Introduction of a new, extra-strong tire for front wheels of farm tractors operating hay, gravel and manure loaders, dirt movers, and similar equipment has been announced by the Firestone Tire & Rubber Co., Akron. Designed to provide extra service and mobility under extremely heavy loads, the tire, called the Firestone Hi-Load Front Tractor Tire, has a load capacity of 1580 pounds in the 6.50x16 size, with inflation of 56 pounds. An extra-strong cord body having an 8-ply rating is said to provide greatly increased resistance to bruise breaks. Also available with the new tire, which is offered in both Rib and Guide Grip tread designs and in four standard sizes, is a series of heavy duty rims especially developed to withstand the higher air pressure of the tires and prevent distortion of the side flanges.

To Expand Lincoln Plant

An expansion program designed to triple production of its mechanical goods plant at Lincoln, Neb., has been announced by the Goodyear Tire & Rubber Co. Additional manufacturing facilities are expected to triple the daily output of V-belts, and production of automotive radiator hose will be augmented by 13,000 feet more per day. Approximately 16,000 square feet of floor space is to be added to the factory as a raw materials warehouse, and more than $100,000 worth of laboratory equipment will be installed for testing materials and products.

LOS ANGELES NEWS

According to the California Section of the American Chemical Society, industry's response to the Pacific Chemical Exposition is considerably beyond expectations. Over 40% of the space available was booked the first two weeks after receipt of the floor plan. The balance of the space is not expected to last long. The Exposition, sponsored by the Section, is scheduled for the San Francisco Civic Auditorium on October 21 to 25.

Further expansion of Goodyear's local manufacturing facilities for mechanical and molded goods has been announced by Frank A. Steele, plant manager. Equipment is to be installed for production of automobile floor mats and several thousand small-type tires for toys, lawnmowers and industrial vehicles will be produced daily. Ben Lee Mattingly, formerly sales engineer at the Goodyear plant in Saint Marys, Ohio, has been named manager of molded goods sales for the Los Angeles area.

Formation in Seattle of a Western Division as a major industrial unit to supervise continually expanding operations centered on the Pacific Coast was recently announced by the Monsanto Chemical Co. The new operating division consists of four plants prominent in the manufacture of plywood glues, paint and wood preservatives. One plant is located in Los Angeles.

The incorporation of Avery Adhesives, Los Angeles, manufacturers of the well-known Kum-Kleen labels, was recently announced by R. S. Avery, general manager of the former partnership firm and now president of the newly formed corporation. Other officers of the new company, which is called the Avery Adhesive Label Corporation, include Dorothy D. Avery, vice-president, and H. Russell Smith, secretary-treasurer.

Samuel J. Mabry, associated with the Goodyear organization since 1935, has been named office manager of the company's local mechanical goods division. He succeeds L. A. Strauss, who resigned recently to enter other business.

Hold Sales Conference

The first of several conferences for the exchange of technical information and discussion of sales policies was recently held in Boston, Mass., by representatives of Godfrey L. Cabot, Inc., and Herron Bros. & Meyer. R. G. Allen, executive vice-president in charge of manufacturing and sales for Cabot, and William A. Herron, a partner of Herron Bros. & Meyer, headed their respective groups at the conference.

Gets Interest in British Firm

U. S. Rubber Co. has acquired an interest in the North British Rubber Co., Ltd., Edinburgh, Scotland. Terms of the agreement between the two companies provide that the North British concern will manufacture goods for the Dominion Rubber Co., a British subsidiary of U. S. Rubber, for resale in Great Britain and for export from Great Britain. Arrangements have been made for a substantial and increasing participation by U. S. Rubber in the common stock of the North British firm. Under the agreement close cooperation will exist between the two companies in Great Britain. The British concern will be entitled to full technical assistance and participation in the benefits of the American company's research and development program.

May Bid on Neoprene Plant

The Government of Poland may shortly make a bid for the government-owned neoprene plant at Louisville, Kentucky, according to Ludwik Wasilewski, technical counselor of the Polish Chemical Industry. Mr. Wasilewski visited the plant the week of January 22 to make an inspection of the property. Du Pont is known to have submitted a bid for the plant, but some objection has been raised on the grounds that permanent ownership of the plant would give the company a monopoly on neoprene manufacture. If the Polish bid is eventually made and accepted, the machinery and equipment would be dismantled and shipped to Poland.

Form Sharples Continental Corp.

Sharples Continental Corp. has been formed as a wholly owned subsidiary of Sharples Chemicals, Inc., and the Continental Oil Co. to engage in the manufacture of synthetic organic chemicals from petroleum raw materials. The first production unit for the new company will be located at Baltimore, Md., on the site of the refinery formerly owned by the Continental Oil Co. The plant will manufacture nonylnaphthalene, an alkylated aryl hydrocarbon used as a raw material for wetting and emulsifying agents. Offices of the new company will be located in Baltimore.

Tire Production in November

Passenger car tire production declined slightly in November, according to the Rubber Manufacturers Association, dropping 7.45% from October's record output of more than 6,666,000 units. November production was gauged at 6,169,875. The decline was attributed to the fact that November was a short month and that substantial production was lost on the Thanksgiving holiday. Production of truck and bus tires and of all types of automotive tubes showed similar declines.

OBITUARIES

Robert J. Moore

Dr. Robert J. Moore, technical coordinator of the Bakelite Corp., died on January 6 at his home in Montclair, N. J., following a heart attack. He was 54 years old. Born in Hoboken, N. J., Dr. Moore received a B. S. degree from Cooper Union in New York City in 1915 and later an M.A. degree from Columbia University. He also held an honorary Ph. D.

A chemistry instructor at Columbia from 1917 to 1920, he was later a director of the Frazer Laboratories, New York City, and served as chief chemist of Pratt & Lambert, Inc., varnish manufacturers in Buffalo, N. Y., from 1924 to 1931. He became manager of the development laboratories of the Bakelite Corp. in Bloomfield, N. J., in 1931, holding that post until his appointment as technical coordinator in 1944.

Dr. Moore was a member of the National Research Council since 1944 under which he served on the Advisory Committee on Plastics and Coatings to the Quartermaster Corps. During World War II, he also served as consultant of the Referee Board O. P. R. D. of the War Production Board and on the Coatings Advisory Board of the Ordnance Department. Since 1932 he had been chairman of the Technical Committee of the New York Paint and Varnish Production Club.

In 1938 Dr. Moore was elected an honorary member of the Chemical Mining and Metallurgical Society of South Africa. He was a member of the New York Academy of Science, the American Institute of Chemical Engineers, and past president of the American Institute of Chemists. A fellow of A. A. A. S., Dr. Moore was a former chairman of the American Section of the Society of Chemical Industry, remaining as American representative of the Plastics Group (London) of the latter, until his death.

Dr. Moore maintained his interest in education through his activities as Trustee of the Polytechnic Institute of Brooklyn and as a member of the Plastics Advisory Council of Princeton University.

William C. Kabrich

William C. Kabrich, manager of the Cedar Knoll, N. J., plant of the Flintkote Co., died of a cerebral hemorrhage at the plant on January 27 at the age of 51. Born in Virginia, Mr. Kabrich was graduated from the Virginia Polytechnic Institute in 1917, and in 1933 received an M.S. degree in chemical engineering from the Massachusetts Institute of Technology. Commissioned a second lieutenant in the Army Reserve Corps in June, 1917, he served in France with the Coast Artillery. He accepted a commission as first lieutenant in the Regular Army in July, 1920, and remained in the Coast Artillery until 1929, when he was transferred to the Chemical Warfare Service. He retired from active duty in the latter branch of service with the rank of brigadier general in the spring of 1946, and joined Flintkote as assistant research director. Several months later he was promoted to the position he held at the time of his death. A widow survives.

Parke H. Watkins

Parke H. "Perry" Watkins, technical director of the Eagle Rubber Co., Ashland, Ohio, died suddenly on January 26 while on a visit to Sandusky, Ohio. He was 62 years old. Mr. Watkins was graduated cum laude from the University of Chicago in Chicago, Ill., where he also did post-graduate work. After completing his studies, he became associated with the William Wrigley, Jr., Co., Chicago, Ill., as a research chemist, and later served in a similar capacity with the U. S. Rubber Co., in New York City and Naugatuck, Conn. Before joining the Eagle organization, he served as director of chemical research for the Barr Rubber Products Co., Sandusky, Ohio. Mr. Watkins was a member of the American Chemical Society, the Professional Engineers of Ohio, the Sigma Mu Fraternity, and the Masonic Order, belonging to several lodges of Masons. A widow and two daughters survive. Mr. Watkins was interred at the Oakland Cemetery in Sandusky.

Harry Hough

Harry Hough, formerly president of the B. F. Goodrich Co., died in Scarsdale, N. Y., early in January at the age of 64. A native of New York State, Mr. Hough learned about industrial methods as senior partner in the public accounting firm of Lovejoy, Mather & Hough. Among the accounts he handled was Goodrich. In 1918, he left the accounting firm and went to Akron as comptroller of Goodrich, becoming comptroller in charge of finances and a director one year later. By 1925 he had become vice-president as well as comptroller, and was appointed president of the concern in 1927. He resigned as head of Goodrich seven months later but continued as a director. After leaving Akron, he joined the New York accounting firm of Stagg, Mather & Hough. A widow, daughter and son survive.

Indonex VG Plasticizer

Standard Oil Co. (Indiana), 910 South Michigan Ave., Chicago 80, Ill., has introduced Indonex VG as a partial replacement for DOP in Vinylite and Geon compounds. In uncompounded Vinylite VYNW and Geon 101 of normal hardness, up to 25 to 30% of the DOP may be substituted without sweating of the plasticizer on standing. In softer stocks containing higher total plasticizer, 35 to 40% of the DOP can be replaced with the new material, and this is also said to apply to compounded stocks with substantial loadings of carbon black, whiting, iron oxide, etc. Outstanding characteristics of Indonex VG are reported to be its low volatility and good aging characteristics in comparison with other DOP substitutes.

Rubber Consumption in November

Consumption of rubber in November, 1946, amounted to 94,782 long tons, a drop of 1.42% from the 96,150 tons consumed in October, according to the Rubber Manufacturers Association. The loss of two working days in November, the result of a shorter month and the holiday, was cited to account for the slight decline. Of the total consumed in November, 37,296 tons were natural rubber and 57,486 tons were synthetic. In the first 11 months of 1946 a total of 941,322 tons were consumed, of which 238,768 tons were natural and 702,554 tons were synthetic. A total of 252,076 tons of reclaimed rubber was consumed in the same period.

Dutch Tighten Export Control

In an obvious attempt to block smuggling activities, the Netherlands East Indies Government on January 29 banned exports of rubber, copra, spices and other commodities from both Indonesian and Dutch-controlled areas, except with the express permission of the government. The various decrees were intended to end authorized export of raw materials from the Indonesian Republic, which controls virtually all of Java and Sumatra except Dutch perimeters comprising about 5% of the territory. Violators of the regulation are threatened with five years of imprisonment and heavy fines.

Compiles Special Bibliography

A bibliography of technical papers relating to the government synthetic rubber program, which appeared in the technical press up to November 1, 1946, has been compiled by the Office of Rubber Reserve, R.F.C., Washington, D. C. In most cases the papers listed in the bibliography describe work supported by Rubber Reserve, but others involving research work not done at government expense are included. It is planned to bring the bibliography up to date at suitable intervals. Copies of the initial bibliography are available on request to Rubber Reserve.

NEW RUBBER GOODS

Produces Huge Heating Pad

A huge electric heating pad has been produced by the Goodyear Tire & Rubber Co., Akron, to serve as an ink-drying

medium in the fabric printing industry. Weighing 187 pounds, the pad is said to be the biggest rubber heating unit ever made for commercial use. It was developed by the company to function as a table-top drying element so that multiple colors may be inked on textiles in one continuous operation. Water-proof and highly flexible, the heating pad is produced "sandwich" style, with specially compounded conductive rubber between non-conductive sheets. Heat output is eight kilowatts, controlled by a thermostat and accomplished without the use of resistant wires or metallic elements. The pad is 30 feet long and 65 inches wide.

Arcor Cowboy Ranch Set

A new set of four rubber toys, packed in a colorful trophy case, has been placed on the market by the Auburn Rubber Corp., 725 West 11th St., Auburn, Ind. The set, called the Arcor Cowboy Ranch Set, consists of a hatchet, pistol, bowie knife, and jack knife. The mounting arrangement of the toys against a simulated wood-panel background is said to

make the removal and replacement of each one quick and easy. A hole in the back of the box enables it to be suspended from a nail or hook as a wall hanging trophy case.

New Type of Fire Blanket

U. S. Rubber Co. is manufacturing a new type of fire blanket which it recommends as a valuable safety and emergency aid to industrial plants, laboratories, hotels, and fire departments. Sixty by eighty inches in size, the blanket is made of high tensile-strength glass cloth, impregnated on both sides with synthetic rubber. Hems and seams are vulcanized and folds are heat-creased. It is equipped with large brass grommets at the top and a weather-resistant bracket so it can be hung up outdoors or indoors and easily removed or replaced. For quick identification, it is red in color and marked with the words "Fire Blanket." Qualities claimed for the blanket are that it is flameproof, heat resistant, chemical resistant, water resistant, mildew proof, vermin proof, non-shrinkable, non-stretchable, and unaffected by cold. The blanket can be used as an emergency wrap if a person's clothing is aflame, an auxiliary fire extinguisher, a fire shield, a welding screen, or as a salvage blanket to protect valuable materials from water, chemicals, and heat.

Goodyear Pliocel Tank

Some further information regarding its Pliocel fuel cell has been made available by the Goodyear Tire & Rubber Co., Akron. Made of nylon, the Pliocel tank weighs only a fraction as much as any

tank previously developed and is more crash-resistant than metal tanks because of its complete flexibility. Whereas metal tanks weigh half a pound per square foot of surface and the bladder type almost as much, the Pliocel tank weighs only eight hundredths of a pound per square foot. A 100-gallon Pliocel can be folded, without damage, to the size of a woman's handbag. Pliocel tanks are now being made in sizes ranging from 5 to 500 gallons.

Vinylite Inflatable Toys

A new line of inflatable vinylite toys has been placed on the market by the Transplastic Manufacturing Co., 133 West 24th St., New York 11, N. Y. These toys, known as Inflatoys, consist of Dooky, the duck; Finny, the fish; Tuffy, the turtle; and Algy, the alligator. Electronically heat sealed at the seams, the toys are said to be washable, sanitary, color-fast, acid-proof, and waterproof.

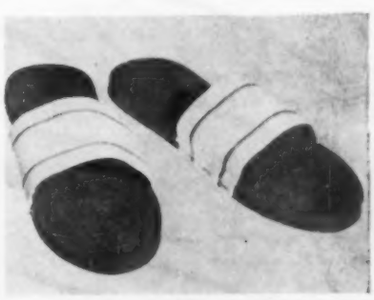
Each toy can be inflated by mouth and remains inflated indefinitely due to a newly developed air-tight valve, which is claimed by the manufacture to be foolproof.

Goodyear Deep Tread Lug Tire

A new deep tread lug tire, which is said to be particularly effective in soft, loamy soil, where steel wheels bog down and where tires with closed tread have a tendency to become clogged and slip, has been developed by the Goodyear Tire & Rubber Co., Akron. Similar in construction to the company's self-cleaning, open center Sure Grip tractor tire, the new tire was designed especially for use in the rice fields of Texas, Arkansas and Louisiana. Tests conducted by the company in the rice fields have indicated that a rubber-tired tractor will travel a distance of 1,320 feet beyond the steel-wheeled tractor in the same time, representing an increase of 15.7% in work per ten-hour day with no greater fuel consumption.

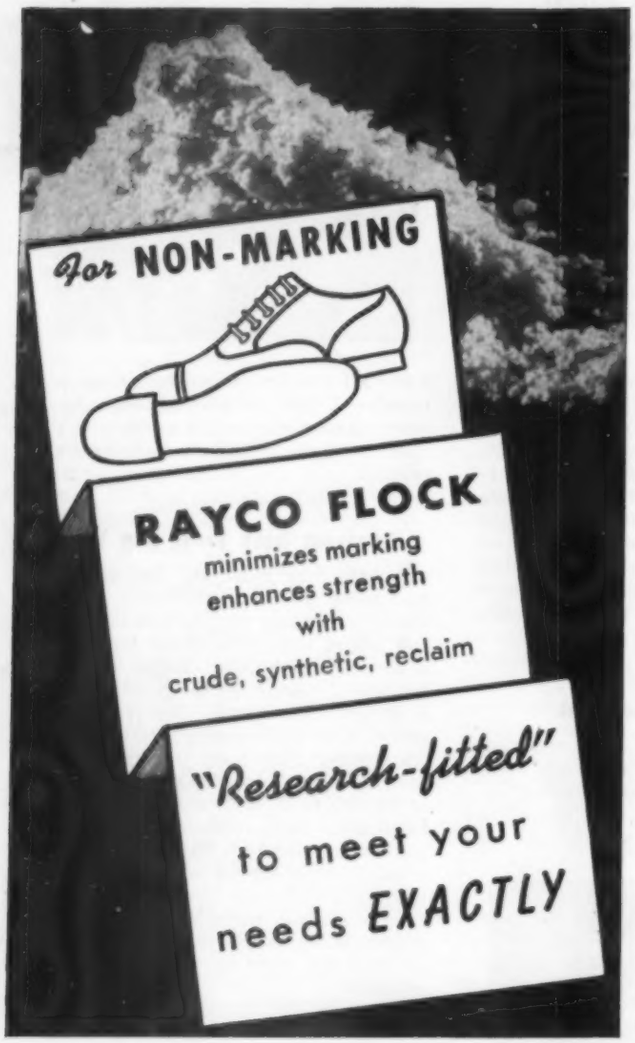
Nylacraft Nylashu Sandals

Nylacraft Industries, P. O. Box 213, Huntington 7, W. Va., has introduced a new type of sandal with an all nylon rubber sole for use in bath, shower, and



locker room, or at the beach. The sole of the new sandal, known as Nylashu, is said to be flexible, skidproof, waterproof, and chemical resistant.

Rayco Flock



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NEW EQUIPMENT

Dual Purpose Electronic Heating Generator

Induction Heating Corp., 389 Lafayette St., New York 3, N. Y., has developed a dual purpose electronic heating generator suitable for both induction and dielectric heating operations. Especially designed for use in experimental laboratories, testing depots and development research departments, this combination induction and dielectric heating generator is provided

View of dual purpose electronic heating generator, suitable for both induction and dielectric operations.

with two separate, interchangeable oscillator sections, one for induction and the other for dielectric heating. Changeover from one oscillator section to the other is a simple job, which is accomplished by removing one oscillator section and replacing it with the other. The induction oscillator feeds into a radio-frequency output transformer, while the dielectric oscillator feeds through coaxial cables to heating electrodes. The unit is a high-frequency generator, operating on 205-245 volts, 60-cycle, single-phase power supply, and having a full-load input of 12 KVA at 90% power factor. Its full-load output is 285 B.T.U. per minute or approximately 5 KW. at nominal frequencies of 375,000 cycles per second for induction heating and 20,000,000 cycles per second for dielectric heating operation. The tube complement of this unit comprises two mercury-vapor rectifiers and one water-cooled oscillator.

Developed to meet the need of laboratories for a rapid and dependable source of heat for a wide variety of heating applications, this new unit is suitable, when operating as a dielectric heating unit, for curing rubber and preheating and polymerizing of plastics. The generator weighs 1400 pounds, and is 36 inches wide, 28 inches deep and 62⅛ inches high. It is known as Ther-Monic Model M-285C.

Elmes Motorless and Pumpless Presses

A complete new line of high-production, fully power-operated hydraulic presses that have neither motor nor pump has been announced by the Elmes Engineering Works of the American Steel Foundries, 1002 Fulton St., Chicago 7, Ill. Compressed air from shop line, introduced above the liquid by a simplified control, provides the power for rapid closure. The press is said to apply and maintain any desired pressure within capacity range, and to repeat at that

pressure until reset. This new hydraulic principle is reported to promise greater economies in the molding of plastics and rubber.

Features of the new hydraulic presses include simple design, lightweight and compact construction, and negligible air requirements. The presses are made in 20- and 30-ton bench-type and floor-type models, and in a 50-ton floor-type model. The 30-ton floor-type model, shown, has a six-inch stroke, an opening adjustable from 0-inch to 13 inches, and can be equipped with 10-inch by 10-inch hot plates. It is 65 inches high and occupies a space of 37 inches by 19 inches.

Have you reserved space yet... in the 1947 RUBBER RED BOOK

Weathering qualities of RUBBER PRODUCTS determined with reliable accuracy in the

ATLAS *twin arc* WEATHER-OMETER

Any selected cycle of exposure to sunlight and wetting can be set for automatic continuous testing in the Weather-Ometer. Exact tests can be duplicated at any time by settings on the control panel which contains temperature regulator—time meter—light and water cycle switch — automatic cut-off switch — voltage adjusting switch — direct reading thermal regulator — reactance coil (for economical current consumption). The Weather-Ometer is fully automatic in operation; can be left unattended over night; only necessary to renew carbons once in 24 hours. Years of exposure to any conditions of weathering reduced to a few days testing in the laboratory with the Weather-Ometer.

Originators and sole manufacturers of accelerated testing machines for over a quarter of a century. Fade-Ometer, Weather-Ometer, Launder-Ometer — the accepted standard testing machines used all over the world.

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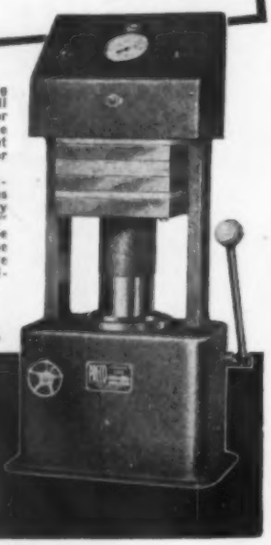
Plant Control
Vulcanizing



Rubber companies are saving money by using Preco Presses for experimental and small production runs — eliminating the need for interrupting production on larger presses. The Preco Press is ideal for many types of plant control jobs as well as in the laboratory for research.

This is a bench type hand-operated hydraulic press. The two-stage pump develops 40,000 pounds pressure on 8"x8" electrically heated, water cooled platens. 8¾" x 12" platens are also available. The press can be equipped with a third platen to double the platen capacity. The pressure and temperature heat controls are extremely accurate. Maximum opening between platens is 8 inches.

PRECO INCORPORATED
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PRECO Hydraulic PRESS

The Perfect UTILITY OVEN

$98.50

Having a temperature range from 35 to 180° C., the "Precision"-Thelco No. 16 laboratory oven can be used for baking, drying, conditioning, preheating and many other applications in every laboratory. Particularly useful as a general purpose oven in large laboratories needing additional equipment to handle overflow work when all other cabinets are busy. The extremely low price of this unit plus its ruggedness and wide field of applications make it an "unusual value" for limited budgets. Write for four page brochure on "Precision"-Thelco equipment.

"PRECISION" THELCO MODEL NO. 16
Recorded proof of Control Accuracy

Reproduced at the right is a typical temperature control chart produced by a recording thermocouple showing accuracy of Model 16 oven. Note the straight band, providing thermostatic control accuracy and uniform width of band indicating temperature uniformity throughout working chamber—FEATURES NEVER OFFERED BEFORE IN A LOW PRICED OVEN.

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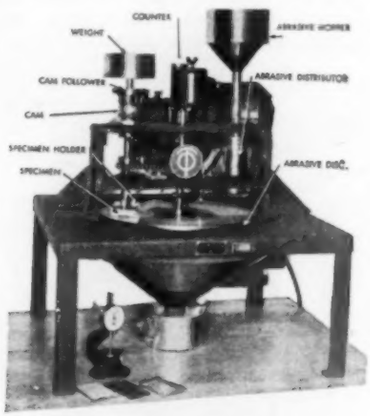
Scientific Research and Production Control Equipment

Olsen Wearometer Testing Machine

Tinius Olsen Testing Machine Co., 500 North Twelfth St., Philadelphia 23, Penna., has announced the availability of a new testing machine for determining the surface resistance properties of walkway materials, such as wood, linoleum, and leather. Called the "Wearometer," it can also be used for testing plastics, laminates, and paint surfaces. Versatility is said to be an outstanding feature of the testing machine. According



to the company, factors such as speed, amount of lift of specimen, amount, size, and kind of abrasive, ratio of specimen shaft speed to abrasive disc speed, size of specimen, and configuration of the specimen can be modified to give the combination of conditions most closely approximating actual service.

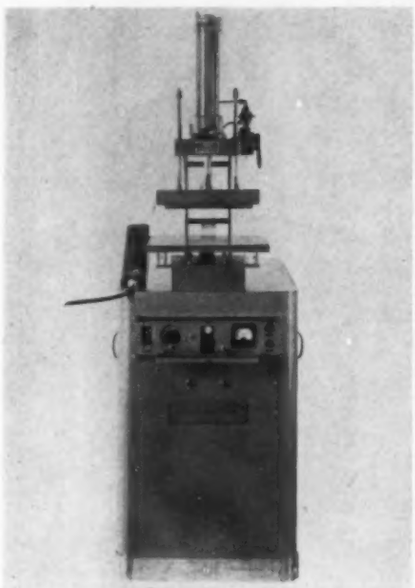
A large steel disc at the base of the machine, upon which abrasive grain is distributed, revolves clockwise at a uniform speed of approximately 23.5 r.p.m. The specimen under test is secured in a holder by two clamps. The holder, which is connected to the vertical shaft of the machine by a universal coupling, is designed so that the surface area of the specimen uniformly contacts the abrading disc. The specimen holder revolves clockwise at a uniform speed of approximately 32.5 r.p.m. A hardened steel cam and cam follower momentarily lifts and drops the specimen back on the abrasive surface twice in each revolution of the specimen. The height of the lift and the drop is 1/16-inch and a ten-pound dead weight provides uniform pressure of the specimen against the abrasive surface. Provision is made for the convenient adjustment of the 1/16-inch rise and fall.

No. 1 Profile Grinder

A new type of profile grinder which finds application in connection with hard rubber and plastics has been developed by the Boyar-Schultz Corp., 2110 Walnut St., Chicago 12, Ill. The grinder, known as the No. 1 Profile Grinder, is said to be applicable where work includes grinding curved surfaces, odd and irregular shapes, profiles, and contours. According to the makers, its high spindle speed of 10,000 r.p.m. makes it particularly efficient in grinding and fitting dies, punches, cams, and templates. The top of the grinder is serrated, which is claimed to free the surface of grindings, thus permitting smoother movement of work and promoting work to closer tolerance.

New Thermatron Dielectric Sealer

A new 2½ KW Thermatron dielectric sealer, known as Type K-S-3 or the "Heatmaster, Jr.," designed for sealing, bonding, or welding thermoplastic sheets, has been introduced by the Thermatron Division of the Radio Receptor Co., Inc., 251 West 19th St., New York 11, N. Y. Completely self-contained and ready



to use, the new 2½ KW Thermatron unit is designed so that a special type of sealing press, one of several standard types, may be mounted on the unit and operated by foot controls. Electrical operation is provided by a remote control box placed at a convenient spot for ready accessibility. Straight or shaped bar electrodes make possible a wide range of seams for sheets of various lengths and thicknesses from .002-inch to .040-inch. Other features include long-life radial fin, air cooled tubes, oversize casters for portability, safety interlocks, industrial type push buttons, overload relays and circuit breaker, connecting terminals, and fully calibrated dial.

No, lock the door *before* it's stolen. In this case, "it" means accuracy, production and profit. . . . Since 1927 the Schuster Magnetic Calender Gauge has consistently served four important ends:

1. It assures uniform thickness in your finished product, down to 1/1000".
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3. It does away with the human equation, *preventing* mistakes.
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The Schuster Gauge does these things by the simple expedient of setting rubber calender rolls to a desired thickness and holding them there. More lately, it has showed itself just as indispensable as "insurance" to synthetic rubber, plastics, cellulose and other materials. The instrument is simple in design, rugged in construction, practically without wearing parts, and adjustable to any thickness.

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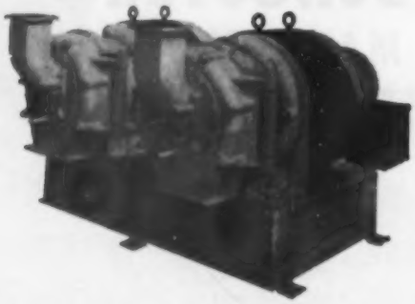
FRIGIDISC GRINDERS



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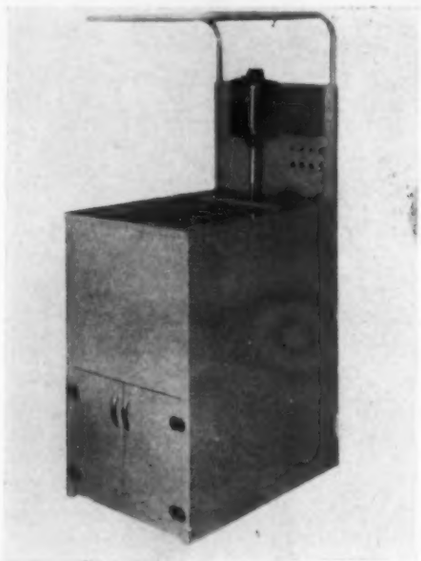
141A Brewery St., New Haven 7, Conn.

Immersion Testing Apparatus

A new type of immersion testing apparatus is being manufactured by Industrial Products, 350 Melbourne Ave., Akron, for use in rubber and other laboratories. Available in two sizes, one accommodating six 38 mm. wide by 300 mm. long test tubes and the other twenty-four similar test tubes, the apparatus is a self-contained unit built of heavy gauge sheet metal and a



welded steel tank. The unit is insulated with magnesium block completely surrounding the tank, which insures operating range from room temperature to 300° F., constant plus or minus 1° F. By using the test tubes, the variable effect due to contamination of other samples is said to be eliminated.

The heating elements of the unit are controlled by a Mercoid switch operated by a Cenco DeKhotinsky Regulator. The strip heaters are mounted on the exterior of the tank and are readily accessible from the back of the unit. Oil agitation is produced by a totally enclosed ball bearing motor, operating a three-blade propeller behind a baffel which produces a constant temperature throughout the bath. The control panel is equipped with flush mounted control switches and indicating lights. Electrical characteristics are 110 volts, 60 cycle A. C.

A new all-metal thermometer, known as the **Max-Min**, which indicates the maximum or minimum temperatures reached, has been introduced by the Weston Electrical Instrument Corp., Newark, N. J. Similar in other respects to the standard Weston all-metal thermometer, the new Max-Min has an auxiliary red index which is manually set by a finger knob and which protrudes from the center of the scale glass.

A special combination **elevating and unloading machine** has been developed by the Revolvator Co., North Bergen, N. J. This automatic barrel loader is an adaptation of a short lift standard portable non-revolvable elevator, incorporating the Zee Bar and other features found in the company's standard line. Included in the design are safety features which are said to make accidents almost impossible.

New Stock Cooling Rack

THIS New Rack offers a convenient method for storing materials that require cooling or air drying.

- Rack can be either stationary or mounted on casters.
- Trays have perforated metal surface and can be spaced to suit.
- Standard Rack has eighteen trays 36" x 36" spaced 2⅝" apart.

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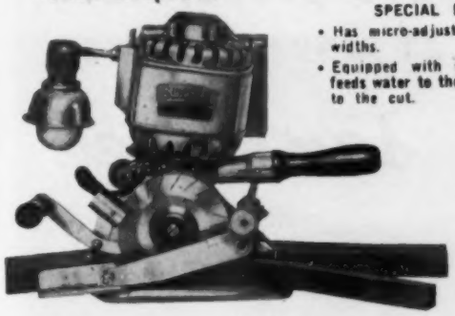
RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
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- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

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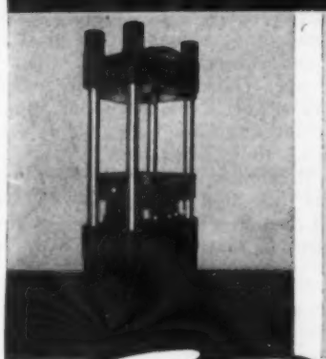
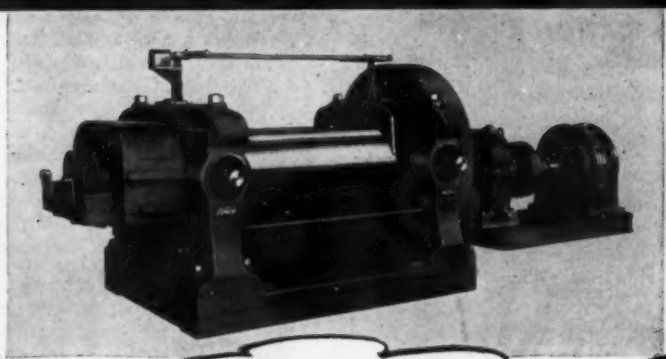
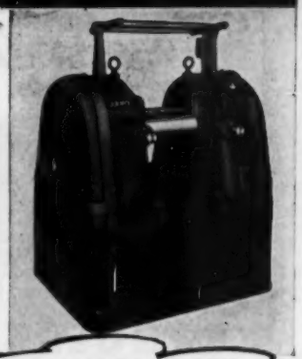


PRESSES



HEAVY DUTY MILLS



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EEMCO Presses are made from 12" x 12" for Laboratory use up to sizes to meet all requirements. The New EEMCO Laboratory Mill (illustrated) is a fully enclosed, self-contained unit with variable speed drive. Streamlined, it is ideal for Laboratory and Small Production. Bulletins sent on request. *Write today for quotations & delivery.*

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Standard of the World

REVIEWS

BOOKS

German Plastics Practice. Published by DeBell and Richardson, Inc., P. O. Box 240, Springfield, Mass. 6¼ x 9¼ in. 554 pp. $7.50.

This is a comprehensive record of the German plastics industry rewritten and amplified from the Quartermaster reports by John M. DeBell (DeBell & Richardson), William C. Goggin (Dow Chemical), and Walter E. Gloor (Hercules Powder), which has been published with permission of the Department of Commerce. The three authors comprised the plastics team, under the leadership of Mr. DeBell, which was sent to Germany to investigate any technical developments in the field of plastics which might have had immediate application to the plastics research program of the Quartermaster Corps in connection with the war in the Pacific.

The report is based on three months study of the principal operating plants and research laboratories in Germany, during which the authors covered 10,000 miles in the territory from the North Sea to Switzerland and from Central Austria to the French border. Visits were made to most of the I.G. Farbenindustrie plants, conferences were held with most of the important technologists in the field, and study was made of the operations of many companies utilizing plastics products. In addition, the data has been supplemented by additional information secured by other technical investigators in the field.

Containing over 350 photographs and diagrams, the book gives thorough manufacturing detail and uses of practically all types of plastics, including the acrylates, phenolics, ureas and melamines, polyamides, etc., and covers molding, extrusion, films and sheetings, polyvinyl chloride pastes, plastic foams, adhesives and fungicides, etc. In addition, it includes a glossary of German trade names in the plastics industry, as well as name and subject indexes.

The report contains a 29-page chapter on "Rubber Observations." As the authors observe, those rubber items which attracted their particular attention had general significance for polymerization, for compounding, or for Quartermaster applications. Reference is made, however, to some of the excellent reports furnished by special teams on the whole German synthetic rubber industry, and some material from such comprehensive reports is incorporated in the chapter.

•

Plastic Craft. By Ernest S. DeWick and John H. Cooper. Published by the Macmillan Co., 60 Fifth Ave., New York 11, N.Y. 8 x 11 in. 184 pp. $5.00.

Intended for the plastics craftsman, beginner or advanced, this excellent book was written with the idea of guiding the reader in the skillful use of his hands and the creative use of his mind. The book includes a number of work projects, arranged to develop skill in the handling of plastics from the simplest to the more involved processes. In each case the simple tools and equipment required are detailed. The drawings of projects appearing in the book were made and tested by the authors or by one or more of the two hundred vocational, industrial or fine arts teachers who were members of the plastics classes conducted by the Vocational Division of the N. J. State Department of Public Instruction. Rather than confuse the prospective user of plastics with the names of all of the basic types,the authors list only a typical and representative group of plastics that have been found satisfactory for home and school use. A brief, non-technical description accompanies each.

Radiant Heating. By T. Napier Adlam. Published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. 6 x 9 in. 472 pp. $6.00.

Intended for engineers, contractors, architects, builders and others concerned with building heating and snow melting for walls, driveways or airports, this book is primarily a working manual on these subjects. It is a thoroughly practical treatise giving the essential facts about radiant or panel heating—the basic principles, working data for the designer, and specific instructions on installation. Chapters include those on theory of heat radiation, artificial heating as related to bodily heat losses, measurement of comfort, determining mean radiant temperature, radiant heating with floor and ceiling panels, air venting and flow adjustment, radiant cooling and air conditioning and step-by-step procedure in radiant heating design. There are 16 chapters in all, a subject index, and a glossary of terms commonly used in heating.

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Experimental Plastics and Synthetic Resins. By G. F. D'Alelio. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 7½ x 10½ in. 185 pp. $3.00.

This book extends the purpose of "A Laboratory Manual of Plastics and Synthetic Resins," which was published in 1943 and which was intended to supply the members of college and university staffs with techniques and processes which could be used as part of a laboratory course in plastics. It consists of 97 separate experiments and 27 specific test methods, many of which are presented in revised form and detail, based on more recent information. In some cases, alternate methods of preparation have been included. Like the earlier edition, the present book is not intended to be a manual of instruction on manufacturing procedures. Rather it demonstrates the chemical reactions used in the preparation of plastic materials, and the prime purpose of each experiment is to demonstrate a principle.

•

Petroleum Production. Vol. II. The Optimum Rate of Production. By Park J. Jones. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 294 pp. $4.50.

As indicated by its title, this book is devoted to a discussion of methods to determine the optimum rate of production from petroleum reservoirs and methods to extract that optimum rate. In the author's opinion, the selection of an optimum producing and operating method is usually more significant than that of estimating the optimum rate of production for a given producing and operating method. The book has 12 chapters, while appendices cover exponential functions and natural logarithms. Subjects covered include the period of development, uniform rates of production and depletion, economic limits for wells and reservoirs, increasing and decreasing rates of depletion, and optima for uniform and variable rates of depletion.

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Mechanisms of Reactions at Carbon-Carbon Double Bonds. By Charles C. Price. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 6 x 9 in. 120 pp. $2.50.

This volume contains a series of lectures presented by the author at the Polytechnic Institute of Brooklyn during the summer of 1945, and represents the first volume of a new series to be published under the title "Lectures on Progress in Chemistry." It consists of seven chapters, as follows: (1) Electronic Structure of Unsaturated Organic Molecules; (2) Ionic Reactions Involving Double Bonds; (3) Free Radical Reactions Involving Double Bonds; (4) Free Radical Addition Polymerization; (5) Copolymerization; (6) Emulsion and Suspension Polymerization; (7) Polar Polymerization. A subject index is included.

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FIRST IN SILICONES

BOOKLETS, CATALOGS, etc.

Report of Conference on Post-War Preparation and Packing of Rubber. London Advisory Committee for Rubber Research (Ceylon and Malaya), c/o Imperial Institute, South Kensington, London, S.W. 7, England. 5½ x 8½. 32 pp.

The London Advisory Committee recently assumed responsibility for making inquiries with regard to the preparation and packing of natural rubber with a view to advising estates as to whether the methods used in 1939 should be re-established or whether improvements are practicable. Under its auspices, a conference of representatives of rubber manufacturing and trade organizations in Great Britain was called and asked to formulate recommendations. As a result of the conference, the views of as many rubber manufacturers as possible, including those of the United States, were obtained. These views, edited and correlated, are contained in this report. The report is divided into three sections covering, respectively, views of manufacturers, large central factories (in Malaya), and conclusions. A minority report on large central factories, and a discussion of the large scale manufacture of standard smoked sheet, the latter prepared by W. G. Birnie, are also included.

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Le Caoutchouc. (Rubber). By Auguste Chevalier and Jean Le Bras. Published by Presses Universitaires de France, 108 Boulevard Saint-Germain, Paris, France. 4½ x 7 in. 126 pp. (In French).

Issued in 1945, this pocket edition size book is one of a series of similar books published under the general title of "Que Sais-Je?", designed to furnish basic information on various products, processes and places to students and the general public. It consists of six chapters, as follows: (1) History and Natural History of Rubber Plants; (2) Cultivation of Rubber Plants, Especially of the Hevea Variety; (3) Tapping, Coagulation of Latex, and the Preparation of Raw Rubber; (4) Chemistry and Technique of Rubber; (5) The Rubber Industry; (6) Production and Commercial Applications. Jean Le Bras, co-author of this work, is research director of the Institut Francais du Caoutchouc.

•

Maintenance of Industrial Electronic Equipment. Westinghouse Electric Corp., East Pittsburgh, Penna. 4 x 6¾ in. 36 pp.

This handbook outlines preventive maintenance techniques designed to maintain top efficiency in performance, to minimize unwanted and costly interruptions in service, and to eliminate costly breakdowns in electronic equipment. Six basic maintenance operations, i.e., cleaning, inspecting, feeling, tightening, adjusting and lubricating, of vacuum and ignitron tubes, capacitors, resistors, fuses, bushings and insulators, relays, switches, transformers, filter chokes, terminal blocks, meters, and other components are discussed. Safety precautions to be observed during preventive maintenance operations are also included.

•

Rotating Electrical Equipment to Meet Your Specific Needs. (Catalog No. 46-1). Electric Specialty Co., Stamford, Conn. 8¼ x 10⅞ in. 8 pp.

Numerous types of typical motors, generators, motor-generator units, converters, and other rotating electrical products made by the company are illustrated in this catalog. Inasmuch as the company builds special equipment to specification and order, the catalog presents a general over-all picture of the scope of its manufacturing ability rather than specific models with definite specifications.

How to Fight Fire and Protect Property with Carbon Dioxide. Randolph Laboratories, Inc., 8 East Kinzie St., Chicago 11, Ill. 6 x 8 in. 24 pp.

Designed specifically for industrial property owners, this booklet graphically explains and illustrates the latest techniques in fighting fires with carbon dioxide and other types of fire extinguishers. It discusses the organization of a fire-fighting system, the selection of extinguishers for hazards involved, the distribution and placement of extinguishers to insure mobility and accessibility, the program of education for employees along with periodic demonstrations as to the operation and location of extinguishers, and the provisions necessary for a thorough inspection and check-up system.

•

The Practical Way to Handle Grievances. Labor Relations Institute, 1776 Broadway, New York 19, N. Y. 5½ x 8½ in. 64 pp.

This special report is intended to help employers set up a well-oiled grievance machinery and, at the same time, to safeguard the provisions of such machinery in the usual labor contract. It includes numerous what-to-do and how-to-do-it practical pointers for recognizing potential grievances. The recommended procedures are all reported to be based on extensive experience. Typical grievance procedure for small firms is included.

•

Shaping a Better Future. Accurate Steel Rule Die Mfrs., 22 West 21st St., New York 10, N. Y. 5¼ x 8 in. 28 pp.

Although this booklet is chiefly addressed to printers, lithographers and paper box manufacturers, it describes a process of die cutting with the company's dies which has recently been successfully adopted by manufacturers in the rubber, plastics, cork and other industries. The process described can be adopted, according to the company, by any manufacturer equipped with a power press. Typical industrial gaskets die cut with steel rule dies are illustrated.

•

Firestone Aircraft Tires and Accessories. Firestone Tire & Rubber Co., Akron 17, Ohio. 8½ x 11 in. 36 pp.

Practically the entire Firestone line of aviation supplies for private plane owners is listed and described in this new catalog. Included among the aircraft products covered are tires and tubes, batteries, brake linings, fabrics, finishes, flight accessories, hardware, flight jackets, plane accessories, polishes, waxes and cleaners, propellers, radio equipment, steerable tail wheels, and wheel-brake units.

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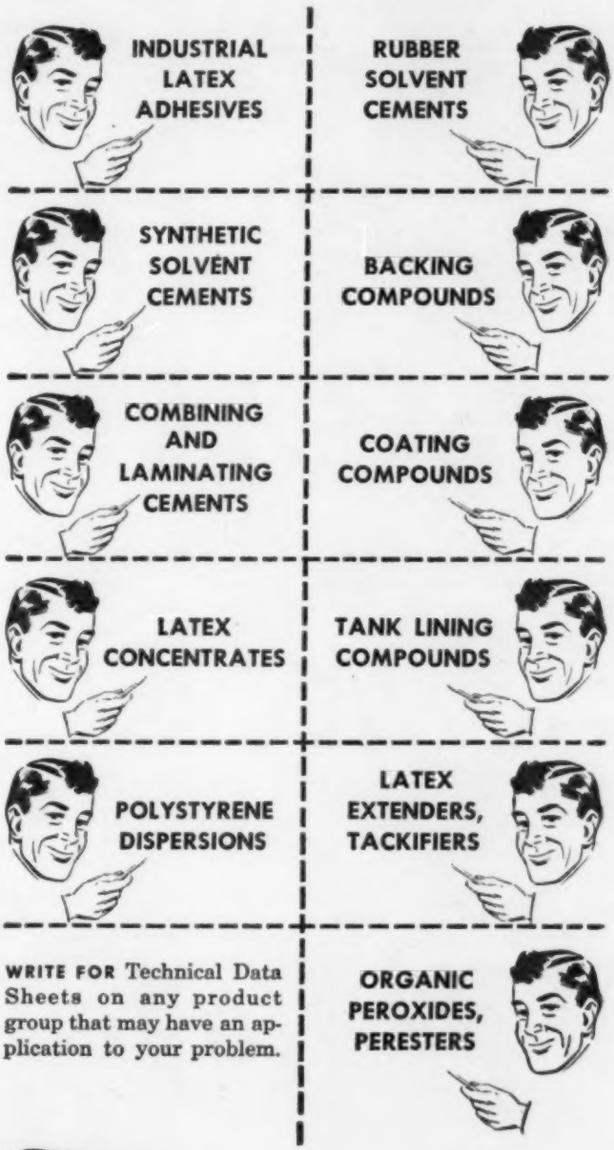

UBS

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Chemical Company Inc.
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, FEB. 6, 1947

Natural Rubber

THE two major factors in the natural rubber field in the past thirty days were the decision of Rubber Reserve to increase the selling price to consumers from the long-established 22½c a pound to 25¾c a pound and the introduction of government legislation which, among other angles, would continue public purchase of natural rubber for several months to come. Rubber Reserve's decision to increase the selling price was based on its first-in-first-out inventory method and the new price is expected to cover the 160,000 long tons purchased at higher prices only. The decision, however, resulted in a storm of protest from rubber consumers.

Of more pertinent interest to dealers and importers, however, was the apparent decision on the part of the Truman Administration to prolong public purchase of natural rubber at least until some Congressional decision was made on the extension of allocation powers. These powers are covered by the Second War Powers Act, which expires on March 31, and on February 7 President Truman recommended that Congress extend such powers for one year "so that Congress may have sufficient time to enact permanent legislation for a national rubber policy." In many quarters it is argued that allocations and public purchase are intimately associated.

Meanwhile, estimates of natural rubber production in the Far East for the current year are being revised upwards. It is now expected that this year's production in five major Far Eastern areas will total 1,035,000 tons. This figure does not include Ceylon and India, where an additional 105,000 tons may be produced. Previous estimates set production for the five major Far Eastern areas at 915,000 tons.

Prices shown below are those established by Rubber Reserve on January 3:

Plantations—

Ribbed Smoked Sheets, No. 1X	.25¾
Thick Pale Latex Crepe, No. 1X	.25¾
Thin Pale Latex Crepe, No. 1X	.25¾
Thick Brown Crepe, No. 1X	.24½
Thin Brown Crepe, No. 1X	.24½
Thick Remilled Blankets, No. 1	.24½
Thin Brown Remilled Crepe, No. 1	.24½
Rolled Brown or Flat Bark	.21½
Smoked Blankets, No. 1	.24½
Claro Brand 1XRSS	.25¾
Sole Crepe Trimmings	.25¼
R.C.M.A. Wtmkd. Crepe, No. 16	.29½
Sole Crepe	.25¾

Wild—

Uncut Fines, Crude	.18¼
Cut Fines, Crude	.18¾
Cut Fines, Washed & Dried	.25¾
Islands Fine, Crude	.17⅞
Weak Fine, Crude	.17⅞
Cameta, Crude	.13
Upriver Coarse, Crude	.15⅞
Manicoba, Crude	.15½
Caucho Ball, Crude	.14⅞
Panama Slab, Crude	.12⅞
Mangabiera, Crude	.11¾
Cameroons, Crude	.19½

Guayule—

Carload Lots	.20¾
Less-than-Carload Lots	.21¼

Latex—

Normal, Tank Car Lots	.29¼
Normal, Carload Drums	.31½
Normal, Less than 1 Drum	.38½
Centrifuged, Tank Car Lots	.31
Centrifuged, Carload Drums	.32½
Centrifuged, Less than 1 Drum	.39¾

Scrap Rubber

The dull conditions which have existed in the scrap rubber market since OPA controls were ended continued in recent weeks. The one bright spot in the market is the continued export demand. Since a good deal of this demand is for tires which are eventually to be used in the Far East as soles for rough but serviceable footwear, distinction is rarely made between natural and synthetic tires. It is this distinction which continues to plague the domestic market for scrap rubber. Reclaimers are still reported to be reluctant to accept mixed shipments and no satisfactory segregating method has yet been found. Freight rates on scrap, as expected, have been adjusted slightly upwards at reclaiming plants. Some demand for natural rubber tire parts and for red tubes is reported. Current quotations on various grades of scrap follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	50.00
No. 1 truck peelings	ton	50.00
No. 2 passenger tubes	lb.	.07½
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06½
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07¼
Red truck tubes	lb.	.07
Black truck tubes	lb.	.07
Buffings	ton	18.00
Air bags and water bags	ton	——
Boots and shoes	ton	——

Cotton Tire Fabrics

For the first time in several years manufacturers of tire fabrics, particularly cotton tire fabrics, report a slight slackening in the demand. Tire fabric plants are still operating at capacity to meet the requirements of the tire field, but there are now indications that full requirements may be met in the near future. As a result of this situation, the fabric producers may be in a better position to meet demands from the export field. These demands have been piling up in recent months, but thus far few tire fabric producers have been able to do much more than acknowledge orders and promise deliveries "in the future." No changes in the price structure have been reported since our last issue. Current quotations on typical grades follow:

Standard, Peeler, 12/4/2	lb.	.7405
Standard, Peeler, 14/4/2	lb.	.7542
Standard, Peeler, 16/4/3	lb.	.7680
Extra Staple, Peeler, 12/4/2	lb.	.8370
Extra Staple, Peeler, 14/4/2	lb.	.8508
Extra Staple, Peeler, 16/4/3	lb.	.8646

Chafers

14.4 oz (per sq. yard)	lb.	.7159
9.25 oz. (per sq. yard)	lb.	.7445
11.65 oz (per sq yard)	lb.	.6444
8.9 oz. (per sq. yard)	lb.	.6873

Sheetings

48x40	36 in.	5.50	yd.	—	@13.276
40x40	36 in.	6.15	yd.	—	@11.890
40x36	36 in.	6.50	yd.	—	@10.723
48x48	40 in.	2.50	yd.	—	@27.594
48x48	40 in.	2.85	yd.	—	@23.075
56x60	40 in.	3.60	yd.	—	@19.229
48x44	40 in.	3.75	yd.	—	@18.830

Cotton

The price of middling uplands on the the Cotton Exchange has swung in the wide range of 231 points since our last report (January 9), high for the period being 33.16 on February 6 and low 30.85 on January 20. The average price for middling uplands for the month of January was 32.58, based on 26 trading days. The pessimistic outlook for business generally after the second quarter of this year, and for soft goods in particular, was held responsible for a 220-point drop during the first ten days of the period. The decline was halted, however, and the trend reversed in the latter half of January on the expectation and subsequent realization of an advance in the mid-January parity price from 26.41c to 26.66c per pound. Parity price in mid-January of 1946 was 21.95c per pound. Other factors influencing the upward trend were the statement of Secretary of Agriculture Anderson regarding resumption of private trade in cototh with Japan and Germany, the continued strong supply and demand outlook in this country, and stimulated foreign inquiries for the staple. Quotations for middling uplands on the Exchange follow:

	Jan. 9	February 6		
	Close	High	Low	Close
May	32.15	31.73	31.26	31.62
July	30.56	29.71	29.25	29.60
October	27.72	27.07	26.69	26.95

Reclaimed Rubber

No abatement in the demand for reclaimed rubber has been noted since our last report. As usual, the demand continued to stem from practically all branches of the rubber manufacturing field, with the tire industry well in the forefront. According to the latest R.M.A. figures, consumption of reclaim in November, 1946, amounted to 24,648 long tons, a drop of 7.71% from the previous month, but a gain of 21.64% over that consumed in November, 1945. Consumption for the eleven months ended November, 1946, amounted to 252,076 tons, an increase of 13.83% over the 221,446 tons consumed in the same period of the preceding year. Tribute to the reclaiming field was paid by CPA Director John D. Small in his latest report. He stated that expansions in reclaiming facilities as well as in rubber fabricating capacity "have helped to maintain the record consumption levels of the past (1946) year." Current quotations follow:

Tires

Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾

Shoe

Unwashed	lb.	.08	@	.08¼

Tube

Black Tube	lb.	.12¼	@	.12½
Red Tube	lb.	.13	@	.13¼

Miscellaneous

Mechanical blends	lb.	.05½	@	.06½
White	lb.	.14	@	.14¼

Ducks

Enameling (single filling)	lb.	—	@	69.750
Belting and Hose	lb.	—	@	67.166
Single filling, A grade	lb.	—	@	63.000
Double filling, A grade	lb.	—	@	67.000

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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

FEBRUARY 7, 1947

Prices are, in general, f.o.b. works.
Range of prices indicates grade or quantity variations.
All trade or brand names are set off in quotation marks.
Abbreviations: bbls., barrels; c.l., carlot; l.c.l., less than carlot; dlvd., delivered; t.c., tank cars; min., minimum; dms., drums; cyl., cylinder.
[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1945 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.
—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.
—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

"A-1"	lb.	.34	.39
"A-10"	lb.	.40	.47
"A-19"	lb.	.52	.58
"A-32"	lb.	.59	.69
"A-77"	lb.	.42	.55
"A-100"	lb.	.42	.55
"Accelerator No. 8" (dlvd.)	lb.	.63	.65
"Accelerator No. 49"	lb.	.40	.42
"Accelerator No. 89" (dlvd.)	lb.	——	1.20
"Accelerator No. 122" (dlvd.)	lb.	——	1.30
"Accelerator No. 552" (dlvd.)	lb.	——	1.63
"Accelerator No. 808" (dlvd.)	lb.	.59	.61
"Accelerator No. 833" (dlvd.)	lb.	1.13	1.15
"Acrin" (dlvd.)	lb.	——	.65
"Advan"	lb.	.52	.55
"Altax"	lb.	.39	.41
"Arazate"	lb.	——	1.53
"Beutene"	lb.	.59	.61
"B-J-F"	lb.	.34	.36
"Butasan"	lb.	——	1.10
"Butazate"	lb.	——	1.10
"Butyl Eight"	lb.	1.00	1.05
"Captax"	lb.	.34	.36
"C-P-B"	lb.	——	1.95
"Cumate"	lb.	——	1.60
"Cuprax"	lb.	.60	.62
"Dibenzo G-M-F"	lb.	——	1.50
"Diesterex-N"	lb.	.50	.52
Diorthotolylguanidine (dlvd.)	lb.	.44	.46
Diphenylguanidine (dlvd.)	lb.	.39	.45
"El-Sixty"	lb.	.39	.46
"Ethasan"	lb.	——	1.10
"Ethazate"	lb.	——	1.10
"Ethyl Tuex"	lb.	——	1.25
Formaniline (dlvd.)	lb.	.36	.37
"G-M-F"	lb.	——	1.95
"Goodrite Erie"	lb.	.60	.62
"Guantal"	lb.	.43	.50
"Hepteen"	lb.	.42	.44
"Base"	lb.	1.80	1.85
"Ledate"	lb.	——	1.20
Mercaptobenzothiazole	lb.	.34	.36
Mercaptobenzothiazyl Disulfide	lb.	.39	.41
"Methasan"	lb.	——	1.20
"Methazate"	lb.	——	1.20
"Monex"	lb.	——	1.25
"Mono-Thiurad"	lb.	——	1.25
"Morfex 33"	lb.	.60	.62
"2-MT" (dlvd.)	lb.	.58	.60
"Namate"	lb.	——	1.00
"Novac"	lb.	——	1.40
"A-13"	lb.	.65	.67
"O-X-A-F"	lb.	.38	.40
"Pentex"	lb.	.74	.77
"Flour"	lb.	.12¼	.12¾
"Phenex" (tons)	lb.	——	.49
"Pipazate"	lb.	——	1.53
"Pip-Pip"	lb.	——	1.63
"R-2 Crystals"	lb.	——	1.55
"Rotax"	lb.	.44	.46
"Safex"	lb.	——	1.15
"Santocure"	lb.	.60	.67
"Selazate"	lb.	——	1.60
"Selenac" (Ethyl, Methyl)	lb.	——	1.60
"Setsit-S"	lb.	.75	1.00
"SPDX-G" (tons)	lb.	——	.53
"Tellurac"	lb.	——	1.60
"Tepidone" (dlvd.)	lb.	——	.63
"Tetrone" (dlvd.)	lb.	——	1.25
"A" (dlvd.)	lb.	——	1.85
Thiocarbanilide (dlvd.)	lb.	——	.28
"Thiofide"	lb.	.39	.46
"Thionex" (dlvd.)	lb.	——	1.25
"Thiotax"	lb.	.34	.41
"Thiurad"	lb.	——	1.25
"Thiuram E" (and "M") (dlvd.)	lb.	——	1.25
"Trimene"	lb.	.54	.56
"Base"	lb.	1.03	1.06
Triphenylguanidine (dlvd.)	lb.	——	.45
"Tuads" (Ethyl, Methyl)	lb.	——	1.25
"Tuex"	lb.	——	1.25
"Ulto" (tons)	lb.	——	.99
"L"	lb.	——	1.04
"Ureka"	lb.	.55	.62
"Blend B"	lb.	.55	.62
"C"	lb.	.52	.59
"Vulcanex" (dlvd.)	lb.	.42	.43
"Z-B-X"	lb.	——	2.45
"Zenite" (dlvd.)	lb.	.37	.39
"A" (dlvd.)	lb.	.42	.44
"B" (dlvd.)	lb.	.39	.41
"Zimate" ("Butyl," "Ethyl")	lb.	——	1.10
"Zimate, Methyl"	lb.	——	1.20

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.08½	.09
Fish Oil, Hydrogenated, Fatty Acid			
"Hyfac S-52"	lb.	.14⅞	.15¾[a]
"Neo-Fat H.F.O." (dlvd.)	lb.	.14⅞	.16⅜
"Stearex Beads" (dlvd.)	lb.	.14⅞	.15¾
Lime, Hydrated			
"Arrowhead"	ton	16.00	19.50
"Sierra"	ton	16.00	19.50
Litharge			
"Eagle" (dlvd.)	lb.	.09¾	.10¾
"FBS" (dlvd.)	lb.	.15	.15½
Magnesium Oxide, Heavy			
"General Magnesite"	lb.	.06	.08
"Michigan No. 15"	lb.	.05	.05½
"Permanente"	lb.	.05	.06½
Magnesium Oxide, Light			
"Baker's" (Neoprene Grade)	lb.	——	.25
"General Magnesite" (Neoprene Grade)	lb.	——	.25
"General Magnesite" No. 101	lb.	——	.175
"General Magnesite" Standard	lb.	——	.22
"K & M"	lb.	——	.28
"Michigan No. 30"	lb.	——	.22½
"Michigan No. 40"	lb.	——	.25
"Witco Extra Light"	lb.	.25	.27
Oleic Acid (dlvd.)	lb.	.12½	.14¾
"Elaine O-18"	lb.	.12½	.13¾[a]
Palm Oil Fatty Acid (c.l.)	lb.	——	.11
Potassium Oleate (drums)	lb.	——	.29½
Red Lead			
"Eagle" (dlvd.)	lb.	.10¾	.11¾
"No. 2 RM" (dlvd.)	lb.	.16½	.17
Sodium Laurate (drums)	lb.	——	.19
Sodium Oleate—Powder (drums)	lb.	——	.35
Paste (drums)	lb.	——	.20
Sodium Stearate—Powder (drums)	lb.	——	.35
USP Grade (drums)	lb.	——	.37
Stearic Acid, Single Pressed			
"S-24"	lb.	.15¾	.15¾[a]
"Stearex B" (dlvd.)	lb.	.15¾	.16¾

ACTIVATORS (Cont'd)

Stearic Acid, Double Pressed			
"Alba" (dlvd.)	lb.	.18¾	.21⅛
"S-2-A" (dlvd.)	lb.	.15⅞	.18⅜
"S-2-B" (dlvd.)	lb.	.15⅜	.16⅜
Stearic Acid, Other			
"Hydrex" (c.l., dlvd.)	lb.	——	.14⅞
"Neo-Fat 1-60" (dlvd.)	lb.	——	.15⅞
"Neo-Fat 1-65" (dlvd.)	lb.	——	.18
"Stearite"	cwt.	14.87	15.87
White Lead Carbonate (dlvd.)	lb.	.09¾	.10¼
Zinc Laurate (c.l.)	lb.	——	.29
"Laurex"	lb.	.33	.34
Zinc Stearate	lb.	.29	.31
"Aquazinc"	lb.	.15	.16

Unclassified Activators

"Activex"	lb.	.20	.22
"Actoflux 1-S"	lb.	.52	.62
"J-S"	lb.	.58	.64
"Aero Ac 50"	lb.	.46	.52
"165"	lb.	.43	.45
"Barak" (dlvd.)	lb.	——	.50
"Bunac K-17"	lb.	.17	.19
"D-B-A"	lb.	——	1.95
"Delac J"	lb.	.55	.57
"P"	lb.	.45	.48
"Dibutylamine No. 117" (l.c.l., dms.)	lb.	——	.69
"Hydrofol Acid No. 51" (dlvd.)	lb.	.1487	.1587
"Palmalene" (drums)	lb.	——	.15
"Polyac" (dlvd.)	lb.	——	1.25
"Ridacto" (drums)	lb.	——	.20
"Snodotte" (dlvd.)	lb.	.1537	.1637
"SOAC" (min. 10 dms.)	cwt.	——	8.00
"Triamylamine No. 180" (l.c.l., drums)	lb.	——	1.01

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.02½	.02¾
"National" (cyl., dlvd.)	lb.	.13	.17
Aqua Ammonia (l.c.l., dms., dlvd.)	lb.	.02½	.02¾
"M.B.M." (l.c.l.)	lb.	——	.35

ANTI-FOAMING AGENTS

"Aero Anti Foam H"	lb.	——	.12
"Regular"	lb.	——	.08½

ANTI-OXIDANTS

"Agerite Alba"	lb.	2.15	2.25
"Gel"	lb.	.55	.57
"Hipar"	lb.	.70	.72
"HP"	lb.	.58	.60
"Powder"	lb.	.43	.45
"Resin"	lb.	.52	.54
"Resin D"	lb.	.43	.45
"Stalite"	lb.	.43	.45
"White"	lb.	1.30	1.40
"Akroflex C" (dlvd.)	lb.	.53	.55
"Albasan"	lb.	.69	.71
"Aminox"	lb.	.43	.45
"Antox" (dlvd.)	lb.	.54	.56
"Aranox"	lb.	——	2.15
Benzoquinone	lb.	1.50	1.75
"Betanox"	lb.	.61	.63
"B-L-E"	lb.	.43	.45
"Powder"	lb.	.61	.63
"B-X-A"	lb.	.43	.45
Carvacrol	lb.	——	.80
Chlorcarvacrol	lb.	——	2.00
"Flectol H"	lb.	.40	.47
"Flexamine"	lb.	.58	.60
Gallic Acid, Tech.	lb.	1.10	1.15
USP or NF	lb.	1.27	1.30
Hydroquinone	lb.	.90	.94
Monomethylparaminophenol sulfate	lb.	2.40	2.90
"Neozone Standard" (dlvd.)	lb.	.61	.63
"A" (dlvd.)	lb.	.40	.42
"C" (dlvd.)	lb.	.43	.45
"D" (dlvd.)	lb.	.40	.42
"D Distilled" (dlvd.)	lb.	.45	.47
"Oxynone"	lb.	1.15	1.22
"Parazone" (dlvd.)	lb.	——	.68
"PDA-8"	lb.	.40	.42
"10"	lb.	.46	.48
"14"	lb.	.60	.62
"Perflectol"	lb.	.58	.65
"Permalux" (dlvd.)	lb.	1.18	1.20
Pyrogallic Acid, Resublimed	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	——	.64

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"Santoflex B"	lb.	.40	.47
"BX"	lb.	.54	.61
"Santovar-A"	lb.	1.30	1.37
"Santowhite"	lb.	1.40	1.52
"S.C.R." (tons)	lb.	——	.32
"Solux" (dlvd.)	lb.	1.28	1.30
"Stabilite" (tons)	lb.	——	.48
"Alba" (tons)	lb.	——	.69
"L" (tons)	lb.	——	.48
Tannic Acid, Tech.	lb.	.70	.79
"Thermoflex" (dlvd.)	lb.	1.18	1.20
"A" (dlvd.)	lb.	.61	.63
"C" (dlvd.)	lb.	.54	.56
Thymol	lb.	——	2.50
"V-G-B"	lb.	.43	.45

ANTI-SCORCHING AGENTS

"Retarder W" (dlvd.)	lb.	——	.36
Salicylic Acid, Tech.	lb.	——	.33
"Vultrol"	lb.	.50	.55

ANTISEPTICS AND GERMICIDES

Formaldehyde (barrels)	lb.	——	.057
"G-4"	lb.	.95	2.50
"G-11"	lb.	3.50	5.50
Methyl Para Hydroxy Benzoate	lb.	——	1.00
Ortho Cresol	lb.	.17½	.18
"Soligen Drier"—Copper 8% (drums)	lb.	——	.17
"Zinc 8%" (dms.)	lb.	——	.15¾

AROMATICS (DEODORANTS)

"Arolene 1980" (c.l.)	lb.	——	.10
"2286"	lb.	——	.25
"2553" (c.l., dms.)	lb.	——	.13
"Bouquet 149"	lb.	——	3.00
Coumarin	lb.	2.75	2.90
"Curodex 19"	lb.	——	4.75
"188"	lb.	——	5.75
"198"	lb.	——	6.75
"D-6 Masking Perfume"	lb.	——	1.35
"Deodorant 65"	lb.	——	1.00
"Deodorant L-37" (25 lbs.)	lb.	——	2.15
"L-44" (25 lbs.)	lb.	——	2.65
"Latex Perfume 5"	lb.	——	3.25
"6"	lb.	——	7.50
"9"	lb.	——	.65
"Neutroleum Delta"	lb.	——	2.40
"Gamma"	lb.	——	3.40
"Paradora A"	lb.	2.00	2.50
"B"	lb.	.65	1.00
"C"	lb.	2.75	3.25
"D"	lb.	1.50	2.00
"E"	lb.	.25	.55
"Rodo No. 0"	lb.	4.00	4.50
"No. 10"	lb.	5.00	5.50
"Rubber Perfume 7"	lb.	——	9.15
"12"	lb.	——	1.90
"Russian Leather 7"	lb.	——	4.10
Vanillin	lb.	2.35	2.40

BLOWING AGENTS

Ammonium Bicarbonate	lb.	.0564	.0651
"Blowing Agent No. 15"	lb.	——	.35
Sodium Bicarbonate, Tech. (c.l., bags)	cwt.	——	1.78½
"Sponge Paste"	lb.	——	.20
"Unicel" (dlvd.)	lb.	——	.50
Urea	ton	68.00	85.00

BONDING AGENTS

"Bonding Resin 4162"	lb.	——	1.50
"Durez 12987"	lb.	.48	.53
"MDI-50"	lb.	——	2.50
"Reanite"	gal.	6.75	7.25
"Rex Compound 482"	gal.	——	1.05
"Ty-Ply Q" (and "S")	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	——	5.83
Glacial—99½% (bbls.)	cwt.	——	9.40
Calcium Nitrate, Tech, Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	——	.085
Zinc Nitrate, Tech.	lb.	.19½	.22

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*

"Lamphlack No. 10"	lb.	.06	.09
"Mapico Black Iron Oxide" (50 lb. bags)	lb.	.081	.0835

Blue

"Blue GD, Dispersed" (dlvd.)	lb.	——	3.95
"Paste" (dlvd.)	lb.	——	1.64
"Blue N" (dlvd.)	lb.	——	.90
"Blue YD, Dispersed" (dlvd.)	lb.	——	1.90
"Monastral Fast Blue CP" (dlvd.)	lb.	——	3.50
"PCD, Dispersed" (dlvd.)	lb.	——	1.95
"Ramapo Blue"	lb.	——	3.40
Ultramarine	lb.	.12	.30

Brown

Brown Iron Oxide	lb.	——	.10
"Mapico Brown" (50 lb. bags)	lb.	——	.1135

Green

Green Chromium Oxide, Pure	cwt.	26.00	27.50
Green Chromium Oxide, Pure, Hydrated	cwt.	70.00	85.00
"Green FD, Dispersed" (dlvd.)	lb.	——	1.35
"Monastral Fast Green GSD, Dispersed" (dlvd.)	lb.	——	2.85
"GSD Paste" (dlvd.)	lb.	——	1.10
"Permansa Green" (dlvd.)	lb.	——	1.78
"Pigment Green B"	lb.	——	1.50
"Ramapo Green"	lb.	——	4.00
"Utility Green"	lb.	——	.28

Orange

"Molybdate Orange"	lb.	——	.38
"Orange F" (dlvd.)	lb.	——	3.05
"FD, Dispersed" (dlvd.)	lb.	——	2.35
"OT" (dlvd.)	lb.	——	2.75

Purple

Purple Oxide	lb.	——	.08

Red

Barium Lithol Red	lb.	.60	.65
Cadmium Red	lb.	.95	1.25
Calcium Lithol Red	lb.	.60	.65
"Graphic Red" (dlvd.)	lb.	——	.65
Indian Red, Pure	cwt.	9.10	10.25
"Jozite"	lb.	.08¼	.08¾
"Mapico Red 297" (50 lb. bags)	lb.	.0885	.096
"Oximony" Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	9.60	10.75
"Red PB" (dlvd.)	lb.	——	1.65
"PBD, Dispersed" (dlvd.)	lb.	——	1.50
"2B" (dlvd.)	lb.	——	1.65
"2BD, Dispersed" (dlvd.)	lb.	——	1.50
"Rubanox Red" CP-762 (dlvd.)	lb.	——	1.18
"Rubber Red CP-339" dlvd.)	lb.	——	.97
"Solfast Red CP-663" (dlvd.)	lb.	——	1.68
"CP-787" (dlvd.)	lb.	——	1.18
"Watchung Red"	lb.	——	1.80

White—Lithopone

"Albalith"	lb.	.044	.049
"Astrolith"	lb.	.0440	.0465
"Cryptone No. 19"	lb.	.05¾	.06¼
"CB No. 21"	lb.	.05¾	.06¼
"Permalith"	lb.	.04¼	.04½
"Ponolith"	lb.	.05½	.05⅞
"Sunolith"	lb.	.0440	.0465
"Ti-Tone"	lb.	.07	.07⅛

White—Titanium Pigments

"Raycal"	lb.	.05½	.05¾
"Rayox"	lb.	.14½	.16¼
"Ti-Bar"	lb.	.05¾	.06
"Ti-Cal"	lb.	.06	.06⅜
"Ti-Pure"	lb.	.15½	.18⅝
"Titanolith"	lb.	.05¾	.06¼
"Titanox A"—all grades (dlvd.)	lb.	.14½	.15¾
"B-30" (dlvd.)	lb.	.05¾	.06
"C" (dlvd.)	lb.	.05½	.05¾
"RA"—all grades (dlvd.)	lb.	.15½	.16¼
"RC-HT" (dlvd.)	lb.	.05½	.05¾
"Zopaque"	lb.	.14½	.15

White—Zinc Oxide (American Process)

"AZO-ZZZ 11" (and "22, 33, 44, 55")	lb.	.09½	.10¼
"Eagle"	lb.	.09	.09⅜
"Horse Head Special"	lb.	.09	.09¼
"XX Red"	lb.	.09	.09¼
"St. Joe Black Label" (dlvd.)	lb.	.09½	.09¾
"Green Label" (dlvd.)	lb.	.09½	.09¾
"Red Label" (dlvd.)	lb.	.09½	.09¾

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	.12

White—Zinc Oxide (French Process)

"AZO-ZZZ 66"	lb.	.11¾	.12½
"Florence Green Seal"	lb.	.10⅜	.11
"Red Seal"	lb.	.10¼	.10½
"White Seal"	lb.	.11¼	.11½
"Kadox 72"	lb.	.09	.09¼
"Black Label"	lb.	.09	.09¼
"Red Label"	lb.	.09	.09¼
"U. S. P. 12"	lb.	.12	.12½

White—Zinc Sulfide

"Cryptone ZS-800"	lb.	.09½	.09¾

Yellow

Chrome Yellow	lb.	——	.24
"Chrome Yellow 12310"	lb.	——	.18
"Ferrox"	cwt.	——	7.38
"Mapico Yellow" (50 lb. bags)	lb.	.0685	.071
"Oximony" Iron Oxide	lb.	——	.06¾
"Yellow G" (dlvd.)	lb.	——	1.75
"GD, Dispersed" (dlvd.)	lb.	——	1.50
"HN" (dlvd.)	lb.	——	1.37
Yellow Iron Oxide, Pure	cwt.	7.10	8.25

DISPERSING AGENTS

"Agchem SA-19"	lb.	——	.30
"SA-20"	lb.	——	.70
"Aquasol-AR 90%"	lb.	——	.14½
"Darvan No. 1"	lb.	.19	.30
"No. 2"	lb.	.19	.30
"Dilex"	lb.	——	.32
"Dispersaid"	lb.	1.25	1.35
"Halloid"	lb.	.03¾	.09½
"HornKem No. 1"	gal.	——	1.60
"No. 3G"	gal.	——	1.75
"No. 12"	lb.	——	.17
"Marasperse CB"	lb.	.10	.20
"Penetrol"	lb.	——	.20
"Plastak"	lb.	.089	.095
"Ramol PW"	lb.	.18	.19
"Rubbex"	lb.	.139	.14¾
"Stan-Chem BQC"	lb.	.12¾	.17¾
"1067"	lb.	——	.13½
"1471"	lb.	.1687	.2187
"2251"	lb.	.12¾	.17¾
Triethanolamine (drums) dlvd.)	lb.	.19	.20
"Triton R-100"	lb.	.15½	.25
"Yelkin TT"	lb.	.26	.35½
"Zinsper"	lb.	——	.15

EXTENDERS

"Advagum 1098"	lb.	——	.42
"Bunaweld Polymer No. 780"	lb.	——	.22
"No. 5514"	lb.	——	.30
"D-92" (and "D-93") (dms.)	lb.	——	.12
"Extender 600"	lb.	——	.13½
"HC-5"	lb.	.08½	.12
"HC-22"	lb.	.12	.15
"Multi-Plast MV 60 Emul."	gal.	.32	.37
"Naftolen MV 60 Emul."	gal.	.60	.65
"HV 60 Emul"	gal.	.75	.80
"PR-162 Latex" (dms.)	gal.	1.00	1.60
"Synprolac"	lb.	——	.19
"Synprowax"	lb.	.16	.19

FILLERS (Inert and Reinforcing)

Abrasives			
"Carbonite"	lb.	.15	.95
"Lionite"	lb.	.09¾	.90
Aluminum Hydrate	lb.	——	.14½
Aluminum Silicate			
"Silical"	ton	37.00	55.00
Barium Carbonate (l.c.l.)	ton	77.00	85.00
Barytes			
No. 1 Floated, White	ton	30.10	40.95
No. 2 Floated, Unbleached	ton	28.10	38.95
"No. 22 Barytes" (c.l.)	ton	——	18.37
"Foam A"	ton	——	30.10
Off-Color, Domestic (l.c.l.)	ton	29.00	32.00
Bentonite (c.l.)	ton	——	10.25
Blanc Fixe	ton	60.00	120.00
Calcium Carbonate			
"Atomite" (c.l.)	ton	——	27.50
"B.I. White No. 1" (c.l.)	ton	——	7.00
"Calcene T"	ton	40.00	50.00
"Camelwhite" (c.l.)	ton	27.50	30.00
"Kalite" (c.l.)	ton	——	33.00
"Kalvan" (c.l.)	ton	——	105.00
"Lesamite" (c.l.)	ton	——	27.50
"Lim-Cal" (c.l.)	ton	——	12.50
"Millical" (bags)	ton	18.00	30.00
"Suprex White"	ton	——	32.50
"Suspenso" (bags)	ton	17.00	29.00
"Swansdown" (bags)	ton	15.00	27.00
"Witcarb R" (c.l.)	ton	——	100.00
"Witcarb R12" (c.l.)	ton	——	32.50
Calcium Silicate			
"Silene EF"	ton	110.00	120.00
Calcium Sulfate, Anhydrous			
"Snow White Filler"	ton	——	16.00
Calcium Sulfate, Hydrous			
"Crysta-Cal" (c.l.)	ton	——	12.50
"Terra Alba No. 1"	ton	12.00	14.40
Chalk Whiting (l.c.l.)	lb.	.0150	.0175
"Recco Paris Whiting"	ton	——	25.00
Clay			
"Alsite" (c.l.)	ton	——	11.00
"Aluminum Flake"	ton	15.00	30.00
"A.S.P. No. 1" (c.l.)	ton	——	30.00
"No. 11" (c.l.)	ton	——	40.00
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"Catalpo" (c.l.)	ton	——	33.00
"Champion"	ton	——	12.00
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"Crown"	ton	——	12.00
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"Hydratex R"	ton	22.00	34.50
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"Markham"	ton	——	12.00
"McNamee" (c.l.)	ton	——	12.50
"Oldham"	ton	——	12.00
"Paragon"	ton	11.00	23.50
"Penna Clay" (c.l.)	ton	——	12.00
"Pigment 33" (c.l.)	ton	——	35.00
"Recco Clay" (c.l.)	ton	——	13.00
"Suprex"	ton	12.00	24.50
"Upton"	ton	19.50	21.00
"Whitetex" (c.l.)	ton	——	50.00
"Witco No. 1" (c.l.)	ton	——	12.00
"No. 2" (c.l.)	ton	——	12.00
Diatomaceous Earth	ton	30.00	50.00
"Kaylorite" (c.l.)	ton	——	30.00
Dolomite (c.l.)	ton	——	12.50

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MARBON "S" AND "S-1"

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HEELS and TOPLIFTS

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★ **EXCELLENT ABRASION RESISTANCE**

★ **SUPERIOR TEAR RESISTANCE**

★ **HARDNESS and STIFFNESS**

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J. J. WHITE PRODUCTS CO. ★

7700 STANTON AVE.
CLEVELAND 4, OHIO

FILLERS (Cont'd)

Flock			
Cotton	lb.	.08½	.20
"Filfloc F 40-9000"	lb.	—	.10½
"Filfloc F 6000"	lb.	—	.16
Rayon, bleached or dyed	lb.	.85	1.50
Rayon, grey	lb.	.10	.12
"Solka-Floc" (l.c.l.)	lb.	.06	.12
Wool, bleached or dyed	lb.	.70	1.00
Glue, Bone (dlvd.)	lb.	.16½	.18½
Ground Glass (l.c.l.)	lb.	.04	.06
Leather, Shredded	lb.	.05	.17
Lignin	lb.	.03	.06
"Indulin"	lb.	—	.09
Limestone, Pulverized	ton	3.25	10.00
"Micro Velva"	ton	30.00	32.00
"Velvet Filler, Regular"	ton	16.00	18.00
Magnesium Carbonate	lb.	.06¼	.08¼
"Clearcarb"	lb.	.10	.10½
"K & M"	lb.	.07½	.08¼
Magnesium Silicate	ton	18.00	35.00
"Airex"	ton	22.50	23.50
"Asbestol"	ton	17.00	25.00
"L.S. Silver"	ton	22.50	23.50
"Sierra White"	ton	19.50	21.00
Mica	lb.	.03	.07
"Concord"	lb.	.05¾	.06¼
"Micro-Mica"	lb.	.06½	.07
"Mineralite" (c.l.)	ton	30.00	40.00
"Silversheen"	lb.	.05¾	.06¼
"Triple A Mica" (c.l.)	ton	—	25.00
"Wet Ground Mica No. 160"	lb.	.05¼	.06¼
Pumice	lb.	.03	.05
Pyrophyllite			
"Pyrax A" (c.l.)	ton	—	11.50
"WA" (c.l.)	ton	—	13.00
Silica	ton	16.00	27.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Talc, Domestic	ton	9.00	20.00
Whiting, Commercial	ton	8.00	20.00
"Cameline" (c.l.)	ton	8.50	10.00
"C-C-O White"	ton	—	14.50
"Keystone" (c.l.)	ton	—	14.00
"Snowflake" (c.l.)	ton	—	16.00
"Veroc" (c.l.)	ton	—	7.50
"York White" (c.l.)	ton	—	9.00
Wood Flour	ton	20.00	62.18

FINISHING MATERIALS, SURFACE

Shellac, Orange Gum	lb.	.70	.95
"VanWax"	gal.	1.25	1.30

FLAME RETARDANTS

Chlorinated Paraffin	lb.	.10	.25
"Zinc Borate 3167"	lb.	.12	.16¾
"Zyrox"	lb.	.35	.45

LUBRICANTS, MOLD

"Aquadag"	lb.	3.15	3.45
"Aquarex L Paste" (dlvd.)	lb.	—	.85
"MDL Paste" (dlvd.)	lb.	—	.25
Borax, Granular (l.c.l.)	ton	56.00	61.00
"Colite Concentrate" (dms.)	gal.	—	.90
"Concentrex"	lb.	—	.20
"Dipex"	lb.	.11	.13
"M"	lb.	.13	.15
"Dri-Lube"	lb.	—	.18
"Glycerized Lubricant"	gal.	—	1.50
"Glydag"	lb.	1.30	2.00
"G.T.M.C. Solution"	lb.	1.05	1.35
"Kokobace"	lb.	—	.12
"Latex-Lube"	lb.	.22¾	.24½
"Liqui-Lube"	lb.	.17¼	.18¼
"Lubrex"	lb.	.25	.30
"Migralube"	lb.	—	.30
"Moldex"	lb.	—	.12½
"Moldeze No. 1"	gal.	—	36.00
"No. 2"	gal.	—	12.00
"No. 3"	gal.	—	12.00
"Mold-Slick"	lb.	.202	.215
"Orvus WA Paste" (dms.)	lb.	—	.25
"Prodag"	lb.	.25	.38
"Redotex Flakes" (dlvd.)	lb.	.14¼	.14¾
"Powder" (dlvd.)	lb.	.14½	.15½
"Rubber-Flo"	gal.	—	1.00
"Rubber-Glo"	gal.	—	.94
"Rusco Mold Paste"	lb.	.12	.18
"Sericite" (l.c.l.)	ton	65.00	75.00
"Ulco Mold Soap"	lb.	.10	.18
"Werkrite Flakes" (dlvd.)	lb.	.12	.12½
"Powder" (dlvd.)	lb.	.12½	.13

LUBRICANTS, RUBBER

Lithium Stearate	lb.	—	.50
Propylene Stearate (drums)	lb.	—	.40
"Rubberol"	lb.	—	.18½

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.30	.31
Calcium Stearate	lb.	.25	.27
"Orel"	gal.	1.85	2.00
Polyethylene Glycol	lb.	.25	.26
"Rexanol A"	lb.	—	.11
"Separex A"	lb.	—	.15

MOLD CLEANERS

"Actusol"	gal.	1.65	1.85
"Metso 99"	cwt.	3.05	4.45
"Granular"	cwt.	2.50	3.55
"Rubber-Sol"	gal.	—	1.89
Sodium Silicate	cwt.	.80	1.40
"Sprex A.C."	lb.	—	.15

PEPTIZING AGENTS

Carbothermic Magnesia	lb.	—	.13½
"Peptizer P-12"	lb.	.75	.83

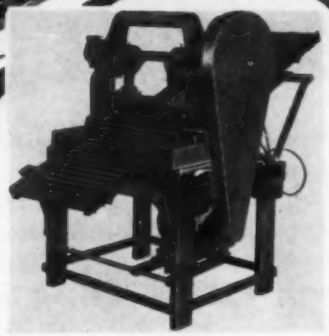
PLASTICIZERS & SOFTENERS

"AA" (drums)	lb.	—	.13¾
"Acto 500"	lb.	—	.09
"Adipol BCA" (dms.)	lb.	.43½	.44
"Amalgamator Z-4"	lb.	—	.30
"American" Pine Tar	gal.	.25	.38½
"Bardex"	lb.	.05	.05¾
"Bardol"	lb.	.02¼	.02¾
"B" (l.c.l.)	lb.	.05	.05¾
"Bavol D"	gal.	.25	.26
"F"	gal.	.37	.40
Beeswax, Refined & Bleached	lb.	.60½	.70
Yellow Refined	lb.	.54	.62
"Bondogen"	lb.	.55	.60
"B.R.C. No. 20"	lb.	.0105	.0115
"B.R.H. 2"	lb.	.0225	.0235
"BRS 700"	lb.	.012	.018
"B.R.T. 3"	lb.	.019	.02
"4"	lb.	.02	.021
"7"	lb.	.0215	.0225
"B.R.V."	lb.	.03	.0375
"Bunarex"	lb.	.05½	.06½
"Bunatak M"	lb.	—	.20
"O"	lb.	—	.18
"R"	lb.	—	.14
"U"	lb.	—	.15
"No. 21"	lb.	—	.08
"No. 90"	lb.	—	.08
"No. 865"	lb.	—	.17
"No. 1080"	lb.	—	.09½
Burgundy Pitch	lb.	—	.10
"Butac"	lb.	.1101	.1476
Butyl Benzyl Sebacate	lb.	.75	.77½
Butyl Palmitate	lb.	—	.26¾
Butyl Roleate	lb.	.16	.18
"BWH-1"	lb.	—	.11
"Campol" (t.c.)	ton	—	42.00
Candelilla Wax, Prime	lb.	.78	.85
"Carbonex"	lb.	.03	.03½
"S"	lb.	.03¼	.03¾
"S Plastic"	lb.	.031	.0335
"Carbowax 4000" (drums)	lb.	.29	.30
"Cardolite 615"	lb.	.32	.35
"816"	lb.	.20	.23
"5858"	lb.	.42	.46
Carnauba Wax, Crude	lb.	1.30	1.77
Refined	lb.	1.85	1.90
Substitute	lb.	.45	1.08
Yellow	lb.	2.00	2.05
"Cellulflex 142" (and "179"), (drums)	lb.	—	.31½
Ceresin Wax	lb.	.15	.25
"Contogum"	lb.	.06¾	.10¼
"Cumar Resins"	lb.	.05¼	.11¾
"Darex Copolymer X11"	lb.	.40	.50
"X54"	lb.	.42	.60
"D.B.M."	lb.	—	.30
Degras, Common	lb.	.10	.14
Diamylphenol (l.c.l., drums)	lb.	—	.21
Dibenzyl Ether (drums)	lb.	—	.40
Dibenzyl Sebacate	lb.	.66	.70½
Dibutyl Phthalate	lb.	.20	.20½
Dibutyl Sebacate—Tech.	lb.	.49	.51½
C.P.	lb.	.51	.53½
Dicapryl Phthalate	lb.	.24½	.27
"Di-Carbitol Phthalate" (dms.)	lb.	.37½	.38
"Dielex"	lb.	.05½	.06
Diethyl Phthalate (t.c.)	lb.	—	.20½
Dihexyl Sebacate	lb.	.47	.49½
Dimethyl Phthalate	lb.	.19	.20½
Dimethyl Sebacate	lb.	.65	.67½
"Dinopol" (dms.)	lb.	.43½	.44
Dioctyl Phthalate (dms.)	lb.	.39½	.40
Dioctyl Sebacate	lb.	.53	.55½
"Dipolymer Oil"	gal.	.33	.38
"Dispersing Oil No. 10"	lb.	.04½	.04¾
"Dutrex A" ("B," "5," "6")	lb.	.02½	.03¾
"15"	gal.	.10	.189
"20," "21," "25"	lb.	—	.03
"Dyal 89"	lb.	—	.45
"Econo-Plast" (drums)	lb.	.03¾	.03¾
"ELA" (dlvd.)	lb.	—	.80
"Estac"	lb.	—	.14½
"Ethox" (dms.)	lb.	.35½	.36
"Flexol DOP" (dlvd.)	lb.	.34½	.36
"Flexol 3GH" (dms., dlvd.)	lb.	.55	.56
"3GO" (dlvd.)	lb.	.51½	.53½
"4GO" (dlvd.)	lb.	.38	.40
"H-70"	lb.	.56¾	.64½
"Hercolyn" (dlvd.)	lb.	.12	.16
"Herco-H.T."	gal.	.17	.22
"Herco-Plas"	lb.	—	.03
"Herco-Wax"	lb.	—	.03½
"HT-300"	lb.	.45¾	.53
"Indonex 633½" ("634½, 638½, 639½")	gal.	.14	.16
"VG" (dlvd.)	lb.	—	.07
"Indopol H-300"	gal.	1.27	1.31
"IMH"	lb.	—	.65
"Kansol" (dms.)	lb.	.50½	.51
"KP 23" (dms.)	lb.	.48½	.49
"70" (dms.)	lb.	.39½	.40
"120" (dms.)	lb.	.59½	.60
"140" (dms.)	lb.	.49½	.50
"150" (dms.)	lb.	.41½	.42
"201" (dms.)	lb.	.40	.42
"Kronisol" (drums)	lb.	.35½	.36
"Kronitex" (drums)	lb.	.31½	.32
Lanolin, Tech., Anhydrous	lb.	.20	.26
Lead Oleate	lb.	.16½	.19¾
"Lindol" (drums)	lb.	—	.25½
2-Mercaptoethanol (drums)	lb.	—	.75

PLASTICIZERS & SOFTENERS (Cont'd)

"Methox" (dms.)	lb.	.35½	.36
Methyl Oleate	lb.	—	.20
Methyl Stearate	lb.	—	.34
"Montan Substitute No. 506"	lb.	.425	.435
"Monten Wax" (c.l.)	lb.	—	.12
"Monty Wax"	lb.	—	.33
"Multi-Plast" (drums)	lb.	.04¼	.04¾
"Naftolen HV" (and "R-100") (drums)	lb.	.11	.12
"LV" and "MV" (drums)	lb.	.05¼	.05¾
"Nerium"	lb.	—	.09
"Nevillac Resins" (drums)	lb.	.17	.50
"Neville Resins" (drums)	lb.	.08½	.14¾
"Nevindene Resins" (drums)	lb.	.10½	.13½
"Nevinol" (drums)	lb.	—	.13
"Nevoll"	lb.	.02	.02½
"Nevtex 10" (drums)	lb.	—	.08
"90" (drums)	lb.	—	.20
"Nuba 1" (and "2") (drums)	lb.	—	.029
"3X" (drums)	lb.	—	.04¾
"15 (and 30) Oil" (drums)	lb.	—	.17¾
"781 Oil" (drums)	lb.	—	.22
"No. 480 Oil Proof Resin"	lb.	.14	.14½
"Opalwax"	lb.	.22	.23
Ortho-Nitrobiphenyl	lb.	.06	.11
"Ozokerite Wax No. 64 White"	lb.	.31	.32
"Yellow"	lb.	.25	.26
"P-1" (and "4, 6, 8, 20")	lb.	.26½	.33
"P-75"	lb.	.66	.72
"Pale 4" (and "1000")	lb.	—	.17¼
Palm Oil	lb.	—	.11
"Paradene Resins" (drums)	lb.	.05¼	.06¼
"Para Flux" (drums)	gal.	—	.19
"2016" (l.c.l.)	gal.	—	.20
"Para Lube" (l.c.l.)	lb.	—	.048
"Paraplex G-25"	lb.	.69	.70
"G-40"	lb.	.47	.48
"Parmo"	lb.	.04½	.12½
"Paroil 143"	lb.	—	.09¾
"170, Powdered"	lb.	—	.18
"Pentalene 90" (l.c.l., dms.)	lb.	—	.17
"92" (l.c.l., drums)	lb.	—	.25
"Pentaphen No. 114" (l.c.l., bags)	lb.	—	.23
"Pepton 22"	lb.	.70	.75
"PG-16" (drums)	lb.	—	.34
"Philplast No. 1"	gal.	.18	.35
"No. 2"	gal.	.13	.35
"Picco 10" (and "25")	lb.	—	.11
"75" (and "100")	lb.	—	.10½
"S.O.S."	gal.	.29	.34
"Piccocizer 30"	lb.	.05½	.06
"D"	lb.	—	.10
"Piccolastic A" (and "B, C, D, E")	lb.	.20	.20½
"F"	lb.	.12½	.13
"Piccolyte S Resins"	lb.	.19	.22½
"Piccoumaron Resins"	lb.	.07	.11
"Piccovar"	lb.	.11	.11½
"Piccovol"	lb.	.02	.02¾
"Pictar"	gal.	.18	.23
"Plas-Blend 360"	lb.	.02½	.03
"Plastac M"	lb.	.08¾	.09¼
"Plasticizer 3"	lb.	.12	.14
"Plasticizer No. 7-2"	lb.	—	.60
"No. 11-2"	lb.	—	.32
"Plasticizer No. 1889"	lb.	—	.565
"No. 1919"	lb.	—	.52
"No. 2069" (l.c.l.)	gal.	—	.23
"No. 2070" (l.c.l.)	gal.	—	.27
"Plasticizer ODN" (Tech.)	lb.	.175	.227
Purified	lb.	.235	.287
"Plasticizer SC"	lb.	—	.50
"Plasticizer VA-1"	lb.	.33	.35
"Plastoflex 50"	lb.	.28	.29
"Plastogen"	lb.	.07¾	.08
"Plastolein X-55" (dms.)	lb.	—	.42
"X-148" (dms.)	lb.	—	.45
"Plastone"	lb.	.27	.30
"Polymel Liquid"	gal.	.12	.17
"Polymel Resins"	lb.	.02½	.05½
"PT 101" ("400, 600, 800") (c.l., drums)	gal.	—	.31
"Refrigerator Oil 145-R"	gal.	—	1.25
"Reogen"	lb.	.11½	.12
"465 Resin" (drums)	lb.	—	.03½
"Resin 731"	lb.	—	.10½
"Resin C"	lb.	.015	.021
"Resinex"	lb.	.02¾	.03¼
"L-4"	lb.	.01¾	.02½
"Ridbo 369" (drums)	lb.	.08	.09
"369-F" (drums)	lb.	—	.12
"Rosin Oil"	gal.	.45	.70
"R.P.A. No. 2" (dlvd.)	lb.	—	.65
"No. 4" (dlvd.)	lb.	—	.80
"No. 5" (dlvd.)	lb.	—	.57
"R.S.N. Flux"	gal.	.10	.19
"R.S.O. Softening Oil"	lb.	.02½	.03
"Rubtar"	gal.	—	.40
"Santicizer B-16"	lb.	.32	.36
"E-15"	lb.	.34	.38
"M-17"	lb.	.35½	.39
"No. 140"	lb.	.25	.35½
"Softener No. 20"	gal.	.09	.25
"S.P.C."	lb.	—	.19½
"S.R.O."	lb.	.02	.02¼
"Stanolind Petrolatum"	lb.	.032	.069
"Wax"	lb.	.25	.30
"Staybelite Resin" (dms.)	lb.	—	.09
"Sunny South" Pine Tar	gal.	.25	.38½
"Superla Wax"	lb.	.23	.28
"Syncera Wax"	lb.	.16	.21
"Synplasticizer"	lb.	—	.10
"Syn Tac" (c.l.)	gal.	—	.33

4-M GUILLOTINE CUTTER



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PLASTICIZERS & SOFTENERS (Cont'd)

"Synthol"	lb.	——	.22½
Tar, Refined	gal.	.10	.15
"K-Tarnel NR" (t.c.)	lb.	——	.0851
"Terpene A"	gal.	——	.65
"Thiokol TP-90 B" (and "TP-95"	lb.	.55	.65
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.24	.25½
Triphenyl Phosphate	lb.	.26	.27
"Turgum S"	lb.	.0926	.1126
"Vanadiset A" (to "F")	lb.	.0165	.05
"Pulverized"	lb.	.08½	.21
"Solution"	gal.	.40	.65
"Vistac No. 1"	gal.	——	1.31
"No. 2"	gal.	——	1.65
"No. 4"	gal.	——	1.79
"Wilcor-Plast"	lb.	.02⅛	.02⅝
"Witresin"			
Granular	ton	50.00	60.00
Solid	ton	40.00	50.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	——	.17¼
Refined (drums)	lb.	——	.15¾
"Castorwax" (min. 400 lbs.)	lb.	——	.25
"Dutrex 7"	lb.	.02½	.03⅛
"30"	gal.	.24	.27
"Resin No. 510"	lb.	——	.16
"Wilmac D-X"	lb.	.09	.10

PROTECTIVE & STABILIZING AGENTS

"Agchem SA-9" (to "SA-12")	lb.	.65	1.02
"Alpha Protein"	lb.	.28	.32
"Aroostoocrat"	lb.	——	.07½
Acacia	lb.	.12¼	.21
Carob Bean Flour	lb.	.45	.60
Casein	lb.	.24	.24¾
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.19	.45
"Prosein"	lb.	.071	.09
"Rex Compound No. 2801"	lb.	——	.15
Sodium Alginate	lb.	——	1.50
"Stablex B"	lb.	——	.95
Starch, Corn, Processed	lb.	——	.0795
Tragacanth Flakes	lb.	.30	1.00

RECLAIMING AGENTS

"1-D Heavy Oil" (drums)	lb.	——	.04
"No. 517 H.B. Oil"	gal.	.11½	.16½
"535"	gal.	.22	.27
"No. 523 H.S. Oil"	gal.	.22	.27
"C-6 Oil" (and "28," "32")	gal.	.33	.38
"C-10 Oil"	gal.	.21	.25
"C-33 Oil"	gal.	.19	.24
Caustic Soda—Flake 76% (c.l., drums)	cwt.	——	3.09¾
Liquid 50% (t.c.)	cwt.	——	2.04¾
Solid 76% (c.l., drums)	cwt.	——	2.41½
Cresylic Acid	gal.	.75	.83
"D-4"	gal.	.19	.24
"E-5"	gal.	.17	.22
"LX-83 Reclaiming Solvent"	gal.	.13	.23
"LX-572 Reclaiming Oil"	gal.	.20	.28
"O Oil"	gal.	.206	.256
"Reclaiming Oil 1621"	6gal.	.02	.02¾
"Reclaiming Reagent No. 3"	lb.	.12	.15
"Reclaiming Resin No. 1"	gal.	.15	.35
"R.P.A. No. 3" (dlvd.)	lb.	——	.46
Soda Ash (c.l., bags)	cwt.	——	1.10¼
"Solvent 534"	gal.	.22	.27
"Solvent Oil 21"	gal.	——	.24
"Wilcor Reclaiming Oil No. 111" (drums)	gal.	.26	.30
"No. 151" (drums)	gal.	.26	.30
"X-1 Resinous Oil"	lb.	.011	.016
"X-60 Solvent"	gal.	.20	.28

REINFORCING AGENTS—CARBON BLACK

Note: New carbon black prices have been announced by some companies for 1947. Those which have been received up to Dec. 16, 1946, are included below.

Channel, Hard Processing (HPC) (bags)

"Atlantic HPC-98"	lb.	.05¾	.102
"Continental F"	lb.	.064	.1025
"Croflex"	lb.	.05¾	.102
"Crow"	lb.	.05¾	.102
"Dixiedensed" (and "S," "66")	lb.	.05¾	.102
"Kosmobile" (and "S," "66")	lb.	.05¾	.102
"Kosmos T"	lb.	.05¾	.102
"Micronex HPC"	lb.	.064	.1025
"Spheron 4"	lb.	.0632	.102
"Witco Disperso No. 6"	lb.	.064	.1025

Channel, Medium Processing (MPC) (bags)

"Atlantic MPC-95"	lb.	.05¾	.102
"Colloidal Micronex" (dms.)	lb.	.07¼	.08¼
"Continental A"	lb.	.064	.1050
"Croflex TH"	lb.	.05¾	.102
"Dixie R-1"	lb.	.05¾	.102
"Dixiedensed HM" (and "S-66")	lb.	.05¾	.102
"Huber TX"	lb.	.064	.1050
"Kosmobile HM" (and "S-66, SMG")	lb.	.03¾	.102
"Kosmos M"	lb.	.05¾	.102
"Micronex Standard"	lb.	.064	.1025
"Spheron 6"	lb.	.0632	.102
"Witco Disperso No. 1"	lb.	.064	.1025

Channel, Easy Processing (EPC) (bags)

"Atlantic EPC E-42"	lb.	.05¾	.102
"Collocarb"	lb.	——	.065
"Continental AA"	lb.	.064	.1025
"Croflex 77"	lb.	.05¾	.102
"Dixiedensed 77"	lb.	.05¾	.102
"Kosmobile 77"	lb.	.05¾	.102
"Micronex W-6"	lb.	.064	.1025
"Spheron 9"	lb.	.0632	.102
"Witco Disperso No. 12"	lb.	.064	.1025
"Wyex"	lb.	.064	.1050

Channel, Conductive (CC) (bags)

"Dixie 5"	lb.	.05825	.107
"Kosmink"	lb.	.05825	.107
"Spheron C"	lb.	.08	.12½
"I"	lb.	.066	.111
"N"	lb.	.18½	.25
"Voltex"	lb.	.15	.18½

Furnace, High Elongation (HEF) (bags)

"Sterling K"	lb.	.05	.09

Furnace, High Modulus (HMF) (bags)

"Continex HMF"	lb.	.05	.09
"Croflex 40"	lb.	.05	.07½
"Dixie 40"	lb.	.05	.07½
"Kosmos 40"	lb.	.05	.07½
"Modulex"	lb.	.05	.09
"Philblack A"	lb.	.05	.06
"Statex 93"	lb.	.05	.09
"Sterling L"	lb.	.05	.09

Furnace, Semi-Reinforcing (SRF) (bags)

"Colloidal Black Dispersion 33" (drums)	lb.	.12¾	.13¾
"Continex SRF"	lb.	.03½	.07½
"Croflex 20"	lb.	.03½	.05½
"Dixie 20"	lb.	.03½	.05½
"Essex"	lb.	.03½	.07½
"Furnex"	lb.	.03½	.07½
"Gastex"	lb.	.03½	.06
"Kosmos 20"	lb.	.03½	.05½
"Pelletex"	lb.	.03½	.06
"Seminex"	lb.	.03¾	.05¼
"Sterling R"	lb.	.03½	.07½
"Sterling S"	lb.	.03½	.07½

Furnace, Fine (FF) (bags)

"Statex B"	lb.	.05¼	.08½

Thermal, Fine (FT) (bags)

"P-33" (c.l.)	lb.	——	.04¾

Thermal, Medium (MT) (bags)

"Thermax" (c.l.)	lb.	——	.02¾

REINFORCING AGENTS—MISCELLANEOUS

"Darax Copolymer No. 2" (and "No. 3")	lb.	——	.46
"Durez 12687" (and "12707")	lb.	.27½	.29
"Marbon B"	lb.	.65	.75
"S" and "S-1"	lb.	.52	.65
"Marmix"	gal.	1.35	1.75
"Naftex EPC"	lb.	.08¼	.11¼
"HMF"	lb.	.06½	.09
"MPC"	lb.	.08¼	.11¼
"SRF"	lb.	.05⅝	.07⅞
"Wilcorite R Resins"	lb.	.27	.29

RETARDERS

"E-S-E-N"	lb.	.34	.36
"Retardex" (tons)	lb.	——	.445

RUBBER SUBSTITUTES

Mineral Rubber

"38"	ton	26.00	32.50
"Black Diamond"	ton	26.00	27.50
"Byerlyte"	ton	32.50	45.00
Gilsonite, Selects (c.l.)	ton	30.50	32.90
"Hard Hydrocarbon" (dms.)	ton	32.00	34.00
Mineral Rubber, Granulated	ton	25.00	27.50
Solid	ton	20.00	22.50
"Parmr" (drums)	ton	26.00	30.00
"Pioneer"	ton	32.50	50.00

Vulcanized Vegetable Oils (Factice)

"Amberex"	lb.	.19	.20½
Brown	lb.	.10	.19
Dispersed	lb.	.17¼	.30¼
"Neophax"	lb.	.15½	.19
White	lb.	.09	.18½

Miscellaneous Rubber Substitutes

"Gilsowax"	lb.	.04½	.05
"Insulac W"	lb.	.05½	.06
"Resin No. 1098" (drums)	lb.	——	.42
"No. 1198"	lb.	.31	.35
"Wilmex M-4" (and "M-6")	lb.	.05½	.06

SOLVENTS

Acetone (dlvd.)	lb.	.07	.08½
"American" Dipentene (t.c.)	gal.	——	.49
"Amsco" Lactol Spirits (t.c.)	gal.	——	.12
"Rubber Solvent" (t.c.)	gal.	——	.11½
"Solv A" (t.c.)	gal.	——	.16
"Solv B" (t.c.)	gal.	——	.18
"Special Napthalite" (t.c.)	gal.	——	.11½
"Textile Spirits" (t.c.)	gal.	——	.12
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	——	.08
Benzol 90%	gal.	——	.21
Butyl Acetate (t.c.)	lb.	——	.198
Butyl Alcohol (t.c.)	lb.	——	.206
Secondary (dlvd.)	lb.	.08½	.10
Tertiary (dlvd.)	lb.	.11	.13
Carbon Bisulfide, Tech.	lb.	.05¾	.08
Carbon Tetrachloride	gal.	——	.80
Cyclohexane	lb.	.11	.11½
Cyclohexanone	lb.	.30	.30½
Diacetone, Pure (dlvd.)	lb.	.10½	.12
Dichlorethyl Ether (drums)	lb.	.16	.17
Formal (drums)	lb.	.26	.27
Dichloropentane (l.c.l., (drums)	lb.	——	.04½
"Dipentene 122" (dms.)	gal.	.56	.58
Ethyl Alcohol (t.c.)	gal.	.53½	.55½
Ethylene Dichloride (drums, dlvd.)	lb.	.07½	.08
Heptanes (t.c.)	gal.	——	.15
Hexanes (t.c.)	gal.	——	.15¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.37½	.47
Ether, Ref. (dlvd.)	lb.	.04½	.06⅛
Mesityl Oxide (dlvd.)	lb.	.10½	.12
Methanol	gal.	.36	.43
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.46	.52
Methyl n-Amyl Ketone (drums)	lb.	.29	.30
Methyl Ethyl Ketone (dlvd.)	lb.	.08	.09½
Methyl Isobutyl Ketone (dlvd.)	lb.	.10½	.12
"N-5" Pentane Mix. (t.c.)	gal.	——	.06½
"N-6" Hexanes (t.c.)	gal.	——	.10¾
"N-7" Heptanes (t.c.)	gal.	——	.09½
"Nevsol"	gal.	.18½	.22
"Petrolene" (t.c.)	gal.	——	.08¾
Picolines, Alpha, Refined	lb.	.23½	.24½
Mixed	lb.	.24	.25
Pyridine, Refined	lb.	.44	.45
Quinoline	lb.	.24½	.25½
"Rubsol" (t.c.)	gal.	——	.07⅛
"Skellysolve B" (Hexanes) (t.c.)	gal.	——	.10½
"C" (Heptanes) (t.c.)	gal.	——	.10
"E" (Octanes) (t.c.)	gal.	——	.129
"R" (Solvent Naphtha) (t.c.)	gal.	——	.081
"Solvenol"	gal.	.49	.58
Solvent, Crude, Light	gal.	.27	.30
"Sunny South" Dipentene (t.c.)	gal.	——	.49
"Tollac"	gal.	.18½	.22
Toluene (drums)	gal.	——	.27
Trichlorethane	lb.	.11	.12
Triglycol Dichloride (drums)	lb.	——	.49
"Tromex"	lb.	.078	.083
"X-7" Sp. Heptanes (t.c.)	gal.	——	.09
"X-8-A Solvent Naphtha"	gal.	——	.07⅛
Xylene (drums)	gal.	——	.27

STABILIZING AGENTS (for Vinyl Resins)

Lead Stearate	lb.	——	.30
"Stabilizer SN"	lb.	.36	.42
"Stabilizer V-1-N"	lb.	.44	.50
"Vanstay"	lb.	.38	.40

SUN CHECKING AGENTS

"Antisol"	lb.	.23	.24
"Heliozone" (dlvd.)	lb.	.23	.24
"Sunproof"	lb.	.23	.24
"Jr."	lb.	.17	.18
"Tonox"	lb.	.50	.52

TACKIFIERS

"Advaresin 100"	lb.	.11	.11½
"Amberol ST-137X"	lb.	.32	.32½
"Agchem RC 30"	gal.	.65	1.34
"Beckopol 1400"	lb.	.24	.25
"Dutrex 44"	gal.	——	.919
"E-310 Resin Emulsion"	lb.	——	.14
"Galex"	lb.	.11	.21
"Koresin"	lb.	.40	.52
"Lindol Emulsion" (drums)	lb.	——	.27
"Liquid Rubber Flux"	lb.	——	.11
"Nevilloid C-55" (drums)	lb.	——	.12
"Pentacizer 344"	lb.	——	.20
"Pentalyn Resins" (dlvd.)	lb.	.14¼	.21
"Resin V"	lb.	——	.13¾
"Rubtack"	lb.	——	.10
"Staybelite Esters" (dlvd.)	lb.	.15	.23¾
"Super-Beckacite No. 1001"	lb.	.37	.38
"Wilcorite R-30"	lb.	——	.40

THICKENERS (FOR LATEX)

"Acrysol GS"	lb.	.15	.22
"Betanol" (drums)	lb.	——	.70
"Emulsorex No. 5"	lb.	——	.35
Propylene Laurate (drums)	lb.	——	.36
Sodium Silicate	lb.	.01	.02

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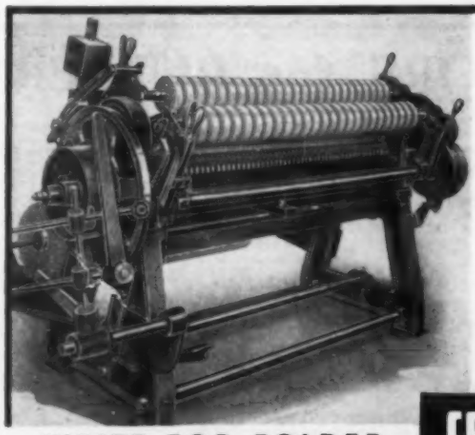

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VULCANIZING AGENTS

Selenium			
"Vandex"	lb.	—	1.75
Sulfur			
"Crystex" (l.c.l.)	lb.	.32	.35
"Dispersed Sulfur"	lb.	—	.09
"No. 2"	lb.	.08	.12
"Devil" (c.l.)	cwt.	—	1.35
"Insoluble Sulfur 60"	lb.	—	.16
"Star" (c.l.)	cwt.	—	1.85
"Tire"	cwt.	1.35	2.05
"Tube" (c.l., dlvd.)	cwt.	—	2.40
Tellurium			
"Latex Telloy"	lb.	—	1.75
"Telloy"	lb.	—	1.75
Miscellaneous Vulcanizing Agents			
"VA-3"	lb.	.55	.65
"Vultac No. 1"	lb.	.38	.45
"No. 2"	lb.	.38	.45
"No. 3"	lb.	.42	.49
WASHING & FINISHING AGENTS			
"Apcolene" (t.c.)	gal.	—	.08½
"Washine"	gal.	.20	.30

WETTING AGENTS

"Advawet No. 15"	lb.	—	.18
"No. 33"	lb.	—	.43
"Aerosol OT 70% Clear"	lb.	.80	1.00
"Agchem SA-15" ("16, 18")	lb.	.17	.29
"Aquarex BBX Conc." (dlvd.)	lb.	—	.70
"D" (dlvd.)	lb.	—	.60
"ME" (dlvd.)	lb.	—	.82
"NS" (dlvd.)	lb.	—	.75
"Areskap 50"	lb.	.30	.38
"Dry 100"	lb.	.60	.72
"Aresket 240"	lb.	.30	.38
"Dry 300"	lb.	.60	.72
"Aresklene 375"	lb.	.42	.57
"Dry 400"	lb.	.70	.84
Lecithin	lb.	—	.26
"Santomerse D"	lb.	.43	.65
"S"	lb.	.13	.25
"Sorbit P"	lb.	—	.28
"Stablex G"	lb.	—	.70
"Triton K-60"	lb.	.29	.36
"N-100"	lb.	1.00	1.07
"720"	lb.	.26	.33
"770"	lb.	.14¼	.22
"Yelkin C"	lb.	—	.55

MISCELLANEOUS CHEMICALS

"Acto 450" ("550-W," "600," "630")	lb.	.09¾	.11¾
"Agchem SA-17"	lb.	—	.29
"Aquarex SMO" (dlvd.)	lb.	—	.40
"A.S.T.M. Oil No. 1" (and "No. 3")	gal.	1.00	1.15
"Black-Out"	gal.	4.50	8.00
"Black Shield 4701"	lb.	—	.21
2-Ethylhexanol (dms., dlvd.)	lb.	.25	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.49½	.50
"Hydrozo"	lb.	—	.51
"MODX" (tons)	lb.	—	.29½
"Para Resin No. 1784"	lb.	—	.09¾
"No. 2457"	lb.	—	.04
"No. 2718"	lb.	—	.04
"Resin No. 1226"	lb.	.31½	.36½
Resorcinol (dlvd.)	lb.	—	.64
"Rio Resin"	lb.	.43	.45
"Santocel"	lb.	—	.50
"Sublac"	lb.	.39	.45
"Synpep N" (drums)	lb.	—	.54
"Tysonite"	lb.	.21½	.22¾
"Vinsol Resin"—Lumps	lb.	—	.04
Pulverized	lb.	—	.04

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RUBBER AND PLASTICS CHEMIST, calendering vinyl film and sheeting a specialty. Thoroughly experienced compound formulation, product development, production supervision, and factory management of calendered and coated sheetings from rubber, synthetic rubber, and vinyl resins; desires responsible position N.Y.C. area. Address Box 2386, RUBBER AGE.

RUBBER CHEMIST, young, married, twelve years in rubber laboratories, desires position as technical sales representative for reliable concern. New England area preferred. Is familiar with compounding of all commercial vulcanizable elastomers. Address Box 2392, RUBBER AGE.

FACTORY SUPERINTENDENT with twenty-five years' experience desires connection with small going or newly organized rubber plant, preferably in New York area. Qualified to efficiently handle help, production problems, compounding and development work with all types of synthetic, molded, sheeted and extruded goods, and sponge. Numerous trade contacts. Address Box 2397, RUBBER AGE.

TECHNICIAN, thirty, B.A. degree, married. Ten years' experience in rubber industry, well versed in hose construction, development and costing, also belting and extrusion experience. Desires position with increasing responsibility and opportunities. Address Box 2400, RUBBER AGE.

LATEX CHEMIST: Six years' experience in development, production and sales of rubber and latex compounds, including foam, dipped goods, coatings, adhesives, etc. Address Box 2403, RUBBER AGE.

SUPERINTENDENT: Fifteen years of experience chiefly mechanical rubber goods and hard rubber. Graduate chemist. Thoroughly familiar modern compounding practice and all factory operations, including costs and specifications. Location immaterial. Available immediately. Address Box 2410, RUBBER AGE.

RUBBER TECHNOLOGIST: Chemist and compounder with many years of experience covering a wide variety of products. Thorough knowledge of rubber manufacturing operation. Services available on short notice. Address Box 2411, RUBBER AGE.

RUBBER AND PLASTICS EXECUTIVE desires position with reliable concern as technical sales representative of rubber or plastic materials or head of development. Formerly chief chemist in rubber plant, presently employed as chief plastic engineer. Wide experience in rubber compounding, vinyl, hot melt, and paper coating formulations; production supervision in plastic molding, extrusion, vinyl calendering, and dielectric heating. Address Box 2414, RUBBER AGE.

MILL ROOM SUPERINTENDENT, practical experience in compounding, mixing, calendering tires, sundries, footwear, and vinyl film, seeks position with responsible concern. Address Box 2415, RUBBER AGE.

HELP WANTED

WANTED: A thoroughly experienced man to organize and operate a very small plant manufacturing rubber heels and soles. He must be thoroughly familiar with all technical details of manufacture and know where to obtain machinery and how to install it. This will be a new department of an old established company in another line. Please give full details of experience, compensation desired, and other pertinent information. Address Box 2373, RUBBER AGE.

EXPERIENCED LATEX CHEMIST: Small midwestern rubber company needs young man with several years experience in natural and synthetic latices. Must be graduate chemist or chemical engineer. Give full details of training, experience, and salary in first letter. Excellent opportunity for right man with progressive young company undertaking a modest expansion program. Address Box 2383, RUBBER AGE.

PRODUCTION OR PLANT MANAGER: Plant in Philadelphia area employing 300, manufacturing small molded rubber parts. Please write fully giving experience and salary expected. Address Box 2384, RUBBER AGE.

LATEX CHEMIST thoroughly familiar wtih natural and synthetic. Mature judgment, to direct research and established control for large eastern impregnation plant. Knowledge of fibre chemistry helpful. Excellent opportunity, salary dependent on ability. Address Box 2387, RUBBER AGE.

RUBBER CHEMIST: One to five years experience for work in Akron, Ohio sales service rubber laboratory. Excellent opportunity for broad training and advancement with rapidly expanding division of large company. Advise age, experience, date available, and salary required. All replies kept strictly confidential. Address Box 2395, RUBBER AGE.

FOREMAN for molding room, small rubber molded items. Plant in Philadelphia area. Please write fully stating experience and salary expected. Address Box 2385, RUBBER AGE.

HELP WANTED (Continued)

PLANT SUPERINTENDENT wanted for plant with about 75 employees. Experience in calendering and embossing, spreading and mixing, and general factory supervision. New York area. Send resume of experience to Box RA 2062, 113 West 42nd Street, New York 18, N. Y.

SURGICAL RUBBER GOODS MAN fully experienced in manufacturing and marketing. Excellent opportunity for right individual. Eastern location. Address Box 2405, RUBBER AGE.

WANTED PRODUCTION SUPERINTENDENT
Mechanical Rubber Goods

Experienced. Must have excellent personnel relations background. Plant of approximately 500 employees. Situated in New England. Write, giving full details of experience, training, age and salary expected. Address Box 2401, RUBBER AGE.

LATEX CHEMIST

Position requires man with broad experience in handling latex technological processes. Background should be in research rather than development. Work will include dipped goods, sponge, thread and adhesives. Must be capable of doing independent work in formulations and methods. Mid-West location. In reply give us complete history of training and experience.

Address Box 2394 RUBBER AGE

TIRE DEVELOPMENT ENGINEER

Major tire company has unusual opening for experienced tire development engineer. Work will be chiefly on passenger, truck and tractor tires, writing specifications and following them through entire manufacturing process. Graduate from recognized technical college important. In first letter cover fully training and background.

Address Box 2406, RUBBER AGE.

RESEARCH CHEMIST

Large Ohio Research Laboratory has position available for trained colloidal chemist to handle important fundamental work in field of latex. Will consider man with major in biological or physical chemistry if he has some training in colloidal work. In reply state age, experience, training and salary expected.

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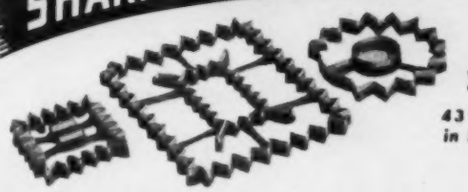
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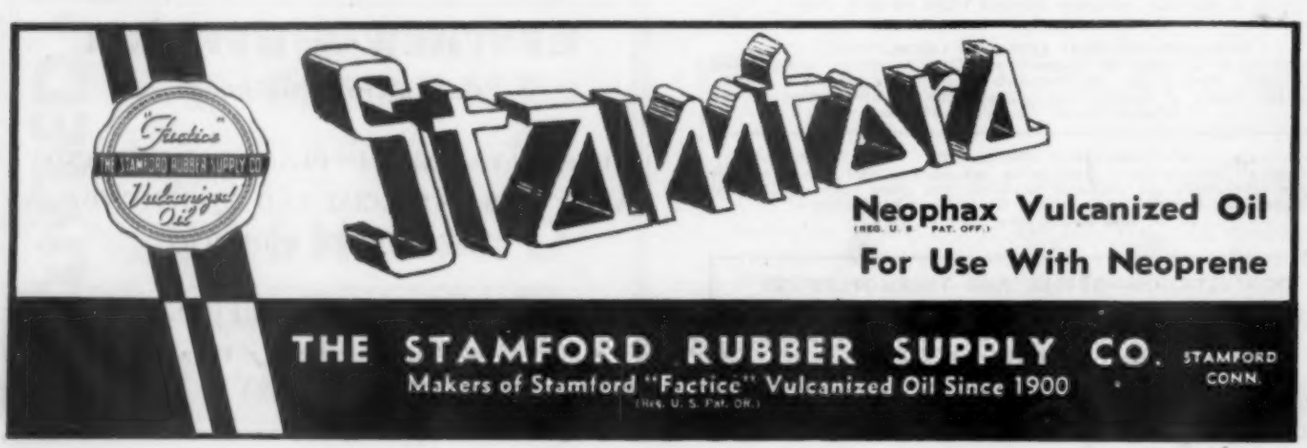

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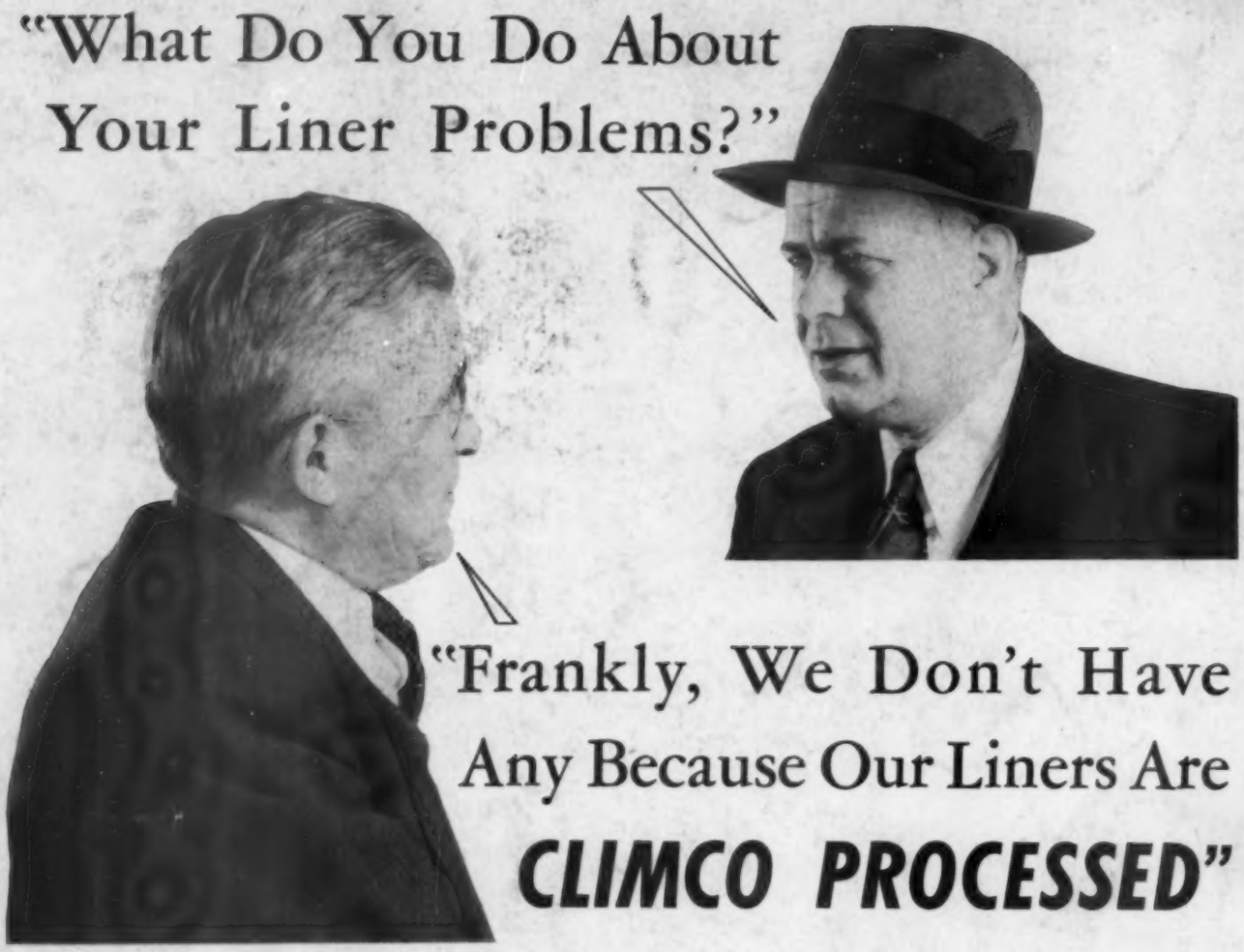

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